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THESIS

**CLOSE ISR SUPPORT:
RE-ORGANIZING THE COMBINED FORCES AIR COMPONENT COMMANDER'S INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE PROCESSES AND AGENCIES**

by

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December 2009

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Intelligence, Surveillance, and Reconnaissance support to counterinsurgency operations is significantly different from the support necessary for conventional, major theater warfare based upon the command levels of planning and execution, the developing nature of "wicked" problems within a counterinsurgency, and the competing needs for highly limited resources. The U.S. Air Force, however, maintains an organizational structure optimized for conventional warfare at the expense of the responsiveness and flexibility necessary to conduct ISR operations in coordination with supported maneuver elements. This thesis identifies the problems encountered by the ISR community in supporting counterinsurgency operations and makes several recommendations for mitigating those problems, among them the development of a dynamic organizational design, a request and tasking process that manages both ISR and operations assets with a focus on the disparate needs of responsible commanders, and the transition to a doctrine focused on real-time ISR integration with, rather than preliminary support to, operations. The doctrine proposed by this thesis is exportable to non-military operations to include disaster recovery and humanitarian relief operations.

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LIST OF ACRONYMS AND ABBREVIATIONS

Entries in *italics* are non-doctrinal developed for the purposes of this thesis or originating from non-official sources.

3ID–3rd Infantry Division

3–509 PIR–3rd Battalion of the 509th Parachute Infantry Regiment

A/C–Aircraft

A2C2–Army Airspace Command and Control

ACC–Air Component Command

ACCE–Air Component Coordination Element

ACM–Asset Coordination Meeting

ACU–Army Combat Uniform

ADCON–Administrative Control

Aff–affirmative

AFNTI–Air Force National Tactical Integration

AFSOC–Air Force Special Operations Command

AGI–Advanced Geospatial Intelligence

AGS–Air Ground System

AH–Attack Helicopter

AIO–Airborne Intelligence Officer

AIT–Airborne Intelligence Technician

ALO–Air Liaison Officer

AO–Area of Operations

AOC–Air Operations Center

ASCOPE–Areas, Structures, Capabilities, Organizations, People and Events

ASOC–Air Support Operations Center

ASOS–Air Support Operations Squadron

ATO–Air Tasking Order

BCD–Battlefield Coordination Detachment

BCT–Brigade Combat Team

BDA–Battle Damage Assessment

C2–Command and Control; Corps Intelligence Division

CAB–Combat Aviation Brigade

CAOC–Combined Air and Space Operations Center

CAS–Close Air Support

CASEVAC–Casualty Evacuation

CAV–Cavalry

CCDR–Combatant Commanders

CCIR–Commander's Critical Information Requirement

CCO–Chief of Combat Operations

CENTAF–Central Air Forces

CF–Combined Forces

CFACC–Combined Forces Air Component Commander

CFLCC–Combined Forces Land Component Commander

CGS–Common Ground Station

CHOPS–Chief of Operations

C-IED–Counter-Improvised Explosive Device

CIOC–Combined Intelligence Operations Center

CM–Collection Manager

CMA–Collection Management Authority

Co–Company

COA–Course of Action

COD–Combat Operations Division

COIN–Counterinsurgency

COM–Collection Operations Management

COMINT–Communications Intelligence

CONOPS–Concept of Operations

COP–Combat Out Post

COTS–Commercial Off The Shelf

CPD–Combat Plans Division

CPOF–Command Post Of the Future

CRM–Collection Requirements Management

DART–DGS Analysis and Reporting Team

DCGS–Distributed Common Ground System

DGS–Distributed Ground Station

DHS–Department of Homeland Security

DIA–Defense Intelligence Agency

DNI–Director of National Intelligence

DoD–Department of Defense

DS–Direct Support

DTG–Date Time Group

EAD–Echelons Above Division

EEI–Essential Elements of Information

ELINT–Electronic Intelligence

EO–Electro-Optical

EOD–Explosive Ordnance Disposal

ER/MP–Extended Range/Multi-Purpose

ES2–Every Soldier a Sensor

ESM–Effects Synchronization Meeting

EWG–Effects Working Group

EWO–Electronic Warfare Officer

F2T2EA–Find, Fix, Track, Target, Engage and Assess

FEMA–Federal Emergency Management Agency

FISINT–Foreign Instrumentation Signals Intelligence

FLIR–Forward Looking Infrared

FMV–full-motion video

FSCL–Fire Support Coordination Line

FSCOORD–Fire Support Coordinator

FSE–Fire Support Element

FW–Fixed Wing

GEOINT–Geospatial Intelligence

GH–Global Hawk

GLO–Ground Liaison Officer

GMTI–Ground Moving Target Indicator

GOI–Government Of Iraq

GOTS–Government Off The Shelf

HLZ–Helicopter Landing Zone

HoA–Horn of Africa

HSI–Hyper-Spectral Imagery

HUMINT–Human Intelligence

HUMRO–Humanitarian Relief Operations

HVI–High Value Individual

IA–Iraqi Army

IAS–Imagery Access Solutions

ICN–ISR Coordination Net

ID–Identify

IDF–In-Direct Fire

IDO–Intelligence Duty Officer

IDT–Intelligence Duty Technician

I MEF–1st Marine Expeditionary Force

IED–Improvised Explosive Device

IIO–Information Integration Officer

ILT–ISR Liaison Team

IMINT–Imagery Intelligence

IO–Information Operations

IOT–In Order To

IP–Iraqi Police

IPB–Intelligence Preparation of the Battlespace

IR–infrared

IROC–Intelligence, Surveillance, and Reconnaissance Operators Course

ISARC–Intelligence Surveillance And Reconnaissance Cell

ISE–Imagery Support Element

ISF–Iraqi Security Forces

ISLT–Intelligence, Surveillance, and reconnaissance Liaison Technician

ISR–Intelligence, Surveillance, and Reconnaissance

ISRD–Intelligence, Surveillance and Reconnaissance Division

ISREC–Intelligence, Surveillance, and Reconnaissance Effects Coordinator

ISRLO–Intelligence, Surveillance, and Reconnaissance Liaison Officer

ISRMC–Intelligence, Surveillance, and Reconnaissance Mission Commander

ISRODO–Intelligence, Surveillance, and Reconnaissance Operations Duty Officer

IT–Information Technology

IVO–In Vicinity Of

JAM–Jaish al Mahdi

JARN–Joint Air Request Net

JASR–Joint Air Support Request

JCMB–Joint Collection Management Board

JFC–Joint Forces Commander

JIASR–Joint Integrated Air Support Request

JIPCL–Joint Prioritized Collection List

JIPOE–Joint Intelligence Preparation of the Operational Environment

JSTARS–Joint Surveillance and Target Attack Radar System

JTAAC–Joint Targeting Attack and Assessment Capability

JTAC–Joint Terminal Attack Controller

JTF–Joint Task Force

LCC–Land Component Commander

LOE–Line Of Effort

LRST–Long Range Surveillance Team

LTIOV–Last Time Information of Value

MAAP–Master Air Attack Plan

MASINT–Measures and Signatures Intelligence

MDS–Mission Design Series

ME–Main Effort

MEC–Multi-INT Exploitation Cell

MEDEVAC–Medical Evacuation

METT-T–Mission, Enemy, Terrain and Weather, Troops and Support, and Time

MNC-I–Multi-National Corps Iraq

MND-B–Multi-National Division Baghdad

MND-C–Multi-National Division Central

MND-N–Multi-National Division North

MNF-I–Multi-National Force Iraq

MOC–Mission Operations Commander

MSC–Major Subordinate Command

MSI–Multi-Spectral Imagery

MTO–Mission Type Order

NASIC–National Air and Space Intelligence Center

NER–No Exploitation Required

NIB–Non-Interference Basis

NLT–No Later Than

NM–Nautical Miles

NORCOM–North Command

NSA–National Security Agency

NTISR–Non-Traditional Intelligence Surveillance and Reconnaissance

O/O–On Order

OB–Order of Battle

OBE–Overcome By Events

Obj–Objective

OEF–Operation ENDURING FREEDOM

OIF–Operation IRAQI FREEDOM

OPELINT–Operational Electronic Intelligence

OPORD–Operations Order

OSINT–Open Source Intelligence

OSVRT–One System Remote Video Terminal

PAO–Public Affairs Officer

PED–Processing, Exploitation, and Dissemination

Pers–Personnel or persons

PIR–Priority Intelligence Requirement

POC–Point of Contact

PRISM–Planning tool for Integration, Synchronization, and Management

PSAF–Precision Small Arms Fire

QRC–Quick Reaction Capabilities

QRF–Quick Reaction Force

R&S–Reconnaissance and Surveillance

RFI–Request for Information

RJ–Rivet Joint

ROVER–Remote Optical Video Enhanced Receiver

RPG–Rocket Propelled Grenade

RSTA–Reconnaissance Surveillance, and Target Acquisition

S&TI–Scientific and Technical Intelligence

SA–Situational Awareness

SAF–Small Arms Fire

SAR–Synthetic Aperture Radar

SCIF–Special Compartment Information Facility

SIDO–Senior Intelligence Duty Officer

SIGINT–Signals Intelligence

SIPRnet–Secure Internet Protocol network

SIR–Specific Intelligence Requirement

SME–Subject Matter Expert

SODO–Senior Operations Duty Officer

SPINS–Special Instructions

SSE–Sensitive Site Exploitation

STANEVAL–Standards and Evaluations

TACON–Tactical Control

TACP–Tactical Air Control Party

TACRECCE–Tactical Reconnaissance

TACS–Theater Air Control System

TECHELINT–Technical Electronic Intelligence

TEL–Transporter Erector Launcher

TF ODIN–Task Force Observe, Detect, Identify, and Neutralize

TIC–Troops In Contact

TOC–Tactical Operations Center

TOPINT–Technical Operational Intelligence

TST–Time Sensitive Target

TTPs–Tactics, Techniques, and Procedures

TUAV–Tactical Unmanned Aerial Vehicle

UAV–Unmanned Aerial Vehicle

USB–Universal Serial Bus

VBC–Victory Base Complex

VIP–Very Important Person

VOSIP–Voice Over Secure Internet Protocol

W/I–Within

I. ORGANIZATIONAL RE-DESIGN AND THE PROBLEM OF CFACC ISR SUPPORT TO COIN OPERATIONS

A. INTRODUCTION

Given the state of the world today, and the acceptance by most senior leadership in the U.S. military that future operations will, in many respects, reflect the day-to-day realities of the current counterinsurgency (COIN) fight, the U.S. Air Force needs to develop (or co-opt) a more responsive system for the employment of intelligence, surveillance, and reconnaissance (ISR) capabilities. As our military continues to foresee "intelligence driving operations," the need for timely, applicable ISR support will continue to grow.

Unfortunately, as Combined Forces Air Component Commander's (CFACC) ISR assets continue to be added to the Iraqi and Afghan Theaters of Operation at an increasing rate, their utility is hampered by the requirements of a planning/tasking/execution process largely developed for a conventional force-on-force engagement. Careful analysis of the CFACC ISR process must be conducted to determine the conditions under which ISR responsiveness can be improved. In recent years, a number of efforts have been undertaken to improve CFACC ISR integration, yet these current endeavors provide primarily temporary fixes to an institutional problem rather than actually re-inventing the process in whole to formalize the procedures. So long as ISR support to COIN is treated as a temporary diversion from the intended large-scale war doctrine, such solutions will continue to rely on "out of hide" manning, limited funding pulled from assorted projects, and be subject to the whims of personality-driven decisions that can easily reverse the considerable gains made thus far.

The current debate over CFACC ISR support to counter insurgency operations features three broadly defined arguments: The Air Force Way, the Army Way, and the Close Air Support (CAS) Way. The first two theories are, as the naming convention suggest, parochial in nature. Not only does each theory ascribe control of the ISR assets to the proposing service, it promotes that service's views of how best to employ assets.

The “Air Force Way” of providing ISR support is efficient, allowing for more targets to be collected per sensor and providing assets for longer periods of time (both in terms of single mission “dwell” times as well as per month number of sorties). Unfortunately, the long lead times required for planning and coordination of ISR assets in this process often result in targets being collected that are no longer of importance (“overcome by events”) and an inability to shift from lower priority, pre-planned targets to newly developed, high priority targets.

The “Army Way” of providing ISR support is more responsive, giving ground commanders greater control over asset usage and therefore able to collect on targets of immediate significance. Adhering to this process, however, will reduce the number of overall sorties available (thus reducing the number of opportunities to employ the asset) and will limit the ability to share assets among different commanders (thus leading to “down times” in which the asset is underutilized).[1]

The “CAS Way” provides a balance of these two options in which a greater number of commanders can have their requests satisfied while ensuring that the targets collected are of the most importance to the supported commander. Although this method will not be as efficient as the “Air Force Way,” it will limit the underutilization of assets while ensuring commanders are able to task the asset against the most pressing, fleeting targets they require. Using the “CAS Way” as the basis, this thesis develops the formal structures, procedures, and plan for executing an ISR strategy that cares for the force (maintenance, crews, and logistics) while providing substantial increases in flexibility with regards to timing and target redirects.

This model emphasizes the doctrinal notion of centralized control and decentralized execution with a focus on joint integration via empowered command and control nodes and liaison officers. To improve this method of ISR utilization, this thesis examines the variables within the planning, tasking and execution stages of ISR

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[1] For a more in-depth discussion of the differences between the “Air Force” and “Army” ways of managing and conducting ISR, see Julian C. Cheater’s Master’s thesis for the School of Advanced Air and Space Studies, “The War Over Warrior: Unmanned Aerial Vehicles and Adaptive Joint Command and Control,” completed in June 2008.

employment. The thesis is organized into seven chapters. The first two chapters identify the problems currently afflicting the ISR constellation, specifically the reorganization of the U.S. Army beginning in 2005 and the "wicked" nature of ISR problems as they pertain to counterinsurgency campaigns. Chapters III, IV, and V summarize current changes made to improve ISR planning, tasking, and execution, and provide the formalized structure necessary to ensure continuity of operations in seamless integration. Chapter VI examines the requirements for a flexible, "dynamic" doctrine that permits future employment of the hard-won lessons of ISR employment in the current war. Finally, Chapter VII summarizes the recommendations of this thesis and brings it all together.

This thesis is developed based upon the personal experiences of the author and those of the men and women of the U.S. Air Force and U.S. Army who conducted ISR operations in the Iraqi theater of operations. The end result is a proposed doctrinal construct that emphasizes integration of joint and coalition forces through integrated planning based upon horizontal linkages and expert liaison support, predictability in tasking that allows for high levels of responsiveness during dynamic situations and in engaging fleeting targets, and flexibility in execution based upon decentralized decision making and seamless integration of ISR and operations elements. The intent is not to replace the current ISR tasking and execution structure, but to augment it with an adaptive capability more applicable to decentralized operations such as those currently experienced in counterinsurgency campaigns.

1. What Is ISR?

In recent years, many studies, articles and academic papers have proposed changes to current ISR processes. Unfortunately, most of these endeavors have largely made their recommendations without a detailed analysis of the underlying causes of the contemporary problems. This chapter, along with Chapter II, seeks to provide insight into the problems that have necessitated a change in the ISR doctrine and processes.

Military commanders are decision makers. Their decisions affect life and death, and they are often responsible for the survival of entire populations. Therefore, their

decisions must be carefully informed and must take into consideration the enemy, terrain, weather and even civilian aspects of the terrain (particularly within a counterinsurgency campaign in which the population is the "center of gravity"). This latter category can include areas, structures, capabilities, organizations, people, and events (ASCOPE)[2] that define the society in which the commander and his or her forces must operate. Such information must be accurate, it must be timely, and it must be relevant to the decisions to be made.

Acquiring this information is the purpose of intelligence, surveillance, and reconnaissance (ISR) operations. ISR must be aggressively and continuously planned and synchronized to integrate the sensors, assets, and processing, exploitation, and dissemination (PED) systems to directly support these decision makers. Such planning and integration must be functions not only of the intelligence community (the "2" in military staff parlance) but also of the operations community (the "3").[3]

More specifically, *intelligence* is defined as the product that results from ISR operations. It is the information that fuels the decision maker's understanding of his operational environment.[4] *Surveillance* provides information to be refined into intelligence through persistent observation via long dwell times with a continuous collection capability oriented not on a specific target but often as a sustained and passive process.[5] *Reconnaissance*, on the other hand, is generally used to provide short duration coverage of a specific target at a specific time in a more active collection

[2] Field Manual Interim (FMI) 2–01, *ISR Synchronization*, November 2008, vi.

[3] Air Force Doctrine Document (AFDD) 2–9, *Intelligence, Surveillance, Reconnaissance Operations*, 17 Jul 2007, 1.

[4] David A. Deptula and Greg Brown, "A House Divided: The Indivisibility of Intelligence, Surveillance, and Reconnaissance," *Air and Space Power Journal*, Summer 2008, 2.

[5] Ibid., 3.

operation.[6]When effectively combined to provide specific, analyzed information gathered through persistent and focused coverage, ISR operations provide the "lifeblood of effective decision making."[7]

2. What Has Changed?

The nature of warfare has changed. A shift from industrial aged massed forces slugging it out over terrain to information age forces that maneuver to seize key nodes and influence the battlespace as much as dominate it has driven intelligence away from counting forces to a focus on precision, from detailed analysis over extend periods of time to "actionable intelligence" within a compressed time frame, and from single service focus to a highly integrated network of joint and coalition agencies.[8]

Specifically, in a counterinsurgency campaign, the role of ISR is to develop an understanding of the issues that drive the insurgency. This requires a focus on the local populace, an integration of intelligence collected at all echelons, and an understanding of the insurgents' ability to operate in complex terrain spanning both the geophysical and human dimensions.[9]

Furthermore, intelligence has grown beyond a "supporting role" and now represents an integrated part of operations. As the commander now drives intelligence, intelligence drives maneuver operations, which in turn feed more intelligence.[10] In an environment in which Brigade Combat Team (BCT) commanders are tasked with solving the problems that lead to insurgencies, the fight is now determined from the bottom-up. Where the Corps and Division used to provide intelligence to their subordinates to accomplish the missions assigned to them by the Corps and the Division, the BCT commander now develops his team's mission and identifies the intelligence he requires to

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[6] Deptula and Brown, "A House Divided," 2.

[7] Ibid.

[8] Ibid., 3.

[9] Field Manual 3–24, *Counterinsurgency*, December 15, 2006, para 3–121.

[10] Z. Tenay Guvendiren and Scott Downey, "Putting the PRIORITY Back into PIR: PIR Development in a COIN Environment," *Small Wars Journal*, http://smallwarsjournal.com/blog/2009/04/pir-development-in-a-coin-envi/, (accessed October 15, 2009).

accomplish the mission. When the Corps and the Division become force providers, the bottom-fed intelligence process requires greater access to ISR capabilities at a much lower level than previously and largely indicates that higher echelon intelligence sections are unable to provide additional resolution to subordinate information requirements.[11]

In short, ISR is in greater demand by a greater number of customers. Furthermore, it is expected to be more responsive, more timely, and more applicable. ISR must be able to adapt as the mission changes, to support operations in real time and to meet needs beyond the targeting of enemy forces.

B. THE MACHINE BUREAUCRACY

The U.S. military is an excellent example of the Machine Bureaucracy as defined by Henry Mintzberg. It is identified by a very formal structure focused on the development and implementation of rules (known within military circles as "doctrine" and "tactics, techniques, and procedures") and an extensive use of a *technostructure* to develop and enforce those rules in standards (in the form of "inspector generals" and "standards and evaluations teams."). (See Figure 1, Mintzberg's Machine Bureaucracy). Standardization of work is the ideal as each Soldier, Sailor, Airman, or Marine is expected to be relatively interchangeable within his/her organization (by which is meant, any infantry company should operate like any other infantry company because each soldier is trained to the same standards and taught the same tactics). There are very formal vertical structures in place regarding the "chain of command," and decentralization of command authority is limited to very specific instances or scope. The purpose of this Machine Bureaucracy is to operate within a stable and simple environment with high efficiency.[12]

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[11] Scott A. Downey and Z. Tenay Guvendiren, "Intelligence, Surveillance, and Reconnaissance Collection Management in the Brigade Combat Team during COIN: Three Assumptions and Ten "A-Ha!" Moments on the Path to Battlefield Awareness," *Small Wars Journal*, http://smallwarsjournal.com/blog/2008/11/intelligence-surveillance-and/ (accessed October 15, 2009).

[12] Henry Mintzberg, "Organization Design: Fashion or Fit?" *Harvard Business Review (January-February 1981)*, 108–109.

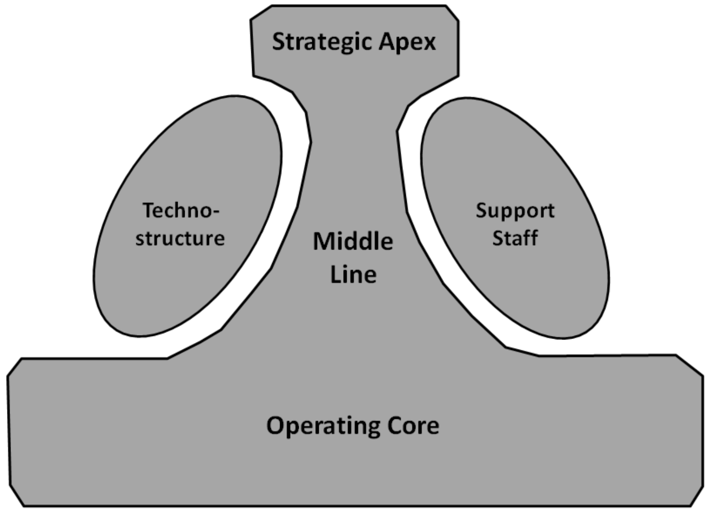

Figure 1. Mintzberg's Machine Bureaucracy[13]

To assert that the modern battlefield is stable and simple may seem unusual, but it must be taken into consideration within the context of engagements with a similar Machine Bureaucracy, namely any standing military. (See Figure 2, Militaries as Machine Bureaucracies.) When encountering another organization with strict formalization and limited decentralization of command, the tactical battlefield may indeed appear considerably more complex or unstable, but the strategic nature of the conflict is markedly less so. Although deception is a common part of warfare, it is more a factor of buying time than of truly doing something unexpected. There are simply a limited number of ways in which organized militaries are able to go to war, and their ability to succeed is based more on the speed with which they are able to act and transition than on their creativity. The United States' superiority in intelligence gathering and command and control allows the U.S. military to more accurately observe the battlespace and to adapt their efforts to those changes. Therefore, the key to military organization is the ability to apply a limited number of forces to the right place at the

[13] After: Mintzberg, "Organization Design," *Harvard Business Review*, Jan-Feb 1981, 105.

right time (known in the U.S. military as "economy of force"). The efficiency and "unity of command" of a machine bureaucracy provide the ideal structure for this type of endeavor.

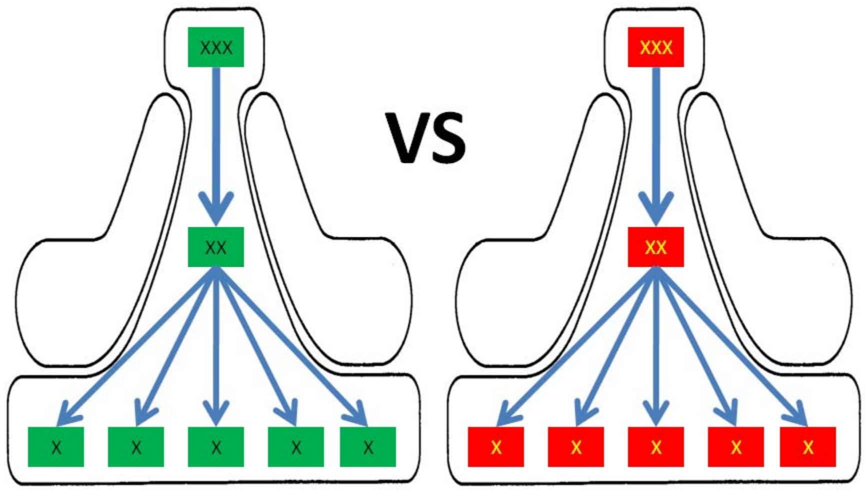

Figure 2. Militaries as Machine Bureaucracies

1. Basic Structure

The Machine Bureaucracy embraces formalization. The concept of the bureaucracy (though largely derided in present organizations) stems from efforts by Max Weber to stem the tide of unjust and corrupt managerial practices.[14] As such, the bureaucracy assures effectiveness by adherence to a universal standard, not subject to individual whim, charismatic personalities, or varying levels of skill. Each division is highly specialized with routine operating tasks, grouped by function and governed by a proliferation of rules and regulations. Formalized communication is used throughout the organization, emphasizing vertical linkages in which superiors make decisions and then

[14] Robert H. Waterman, Jr., *Adhocracy*, (New York: W. W. Norton & Company, 1990), 26.

distribute those decisions down to subordinates in parallel. Power is highly centralized, and there is a clear distinction between the elaborate administrative staff ("combat support" such as intelligence, logistics and similar elements) and the operating core[15] (maneuver units to include infantry and armor elements).

Standardization of procedure and systems is the key to efficiency of the Machine Bureaucracy. Effectiveness is often a measure of efficiency in which the ability to produce is balanced against the costs to do so. To ensure the greatest level of standardization and, in turn, efficiency, the Machine Bureaucracy relies heavily upon a *technocratic* staff that regulates, manages, and provides quality control over the Machine Bureaucracy's functions. Due to this level of responsibility, the technocratic staff often possesses a level of informal authority far beyond what might be immediately observable from the centralized nature of the Machine Bureaucracy.[16]

2. Context for Effectiveness

Machine Bureaucracies thrive in stable and simple environments. The standardized nature of the work produced by the Machine Bureaucracy combined with the formal communication of its centralized decision making dictate that the Machine Bureaucracy operate most efficiently in situations for which it was specifically designed.[17] Mature Machine Bureaucracies that have had time to establish their standardized procedures tend to be more efficient than their competitors in the environments in which they developed. Challenging a Machine Bureaucracy in such a stable condition is likely to be unsuccessful as routinized functions are easily managed and efficiency can promote effectiveness.

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[15] Henry Mintzberg, *Structures in Fives: Designing Effective Organizations* (Upper Saddle River, NJ: Prentice Hall, 1993), 164.

[16] Ibid., 165.

[17] Ibid., 171

3. Limitations

A significant limitation of the Machine Bureaucracy, particularly as it applies to military operations, is the need for centralized authority figures to deal with all decisions. The formalized communications, the very discreet divisions in function, rely heavily on a central figure to resolve all issues and then disseminate the proper guidance to all concerned. This can lead to a few central leaders becoming overwhelmed with decisions that may be more effectively made at lower echelons. Furthermore, by requiring decisions to be made at echelons far removed from the decision itself, such top managers are often possessed of inadequate, superficial information that does not reflect the "tangible detail" of the situation to be resolved.[18]

C. JOINT PLANNING IN A CONVENTIONAL CAMPAIGN

1. 21–25 March 2003—Campaign Planning and the "Dust Storm"[19]

21 March 2003: This was the type of organization that executed Operation Iraqi Freedom. The highest fielded echelon of the U.S. Army, the Corps, was responsible for developing the land component's strategy and overall objectives. Such planning is typically focused on operations to begin after 96 hours.[20] This was the first day of combat operations and V Corps, designated as the main effort of coalition forces, had identified the axis of advance toward Baghdad and designated the 3rd Infantry Division (3ID) as its Main Effort (ME).[21] Through the use of a warning order, the Corps typically provides its intentions to its Divisions so that they in turn can begin the planning necessary to achieve the objectives assigned to them by the Corps.[22] In preparation for

[18] Mintzberg, *Structures in Fives*, 185.

[19] The mission described is based on historical events over the given dates. Specific details have been altered to preserve operational security and to refine the narrative for ease of understanding.

[20] Field Manual 6–20–30, *Tactics, Techniques, and Procedures for Fire Support for Corps and Division Operations*, October 18, 1989, Chapter 2.

[21] Dr. Charles Kirkpatrick, "16 Days to Baghdad," V Corps Public Affairs, 2, http://www.vcorps.army.mil/references/16_days_to_baghdad_pamphlet_onscreen_version.pdf, (accessed May 15, 2009).

[22] Field Manual 5–0, *Army Planning and Orders Production*, January 2005, 1–24.

seizing the key terrain of the Karbala Gap, which would give access to Baghdad,[23] 3ID was tasked with seizing Objective Chargers. (See Figure 3, Objective CHARGERS in Vicinity of Karbala.)

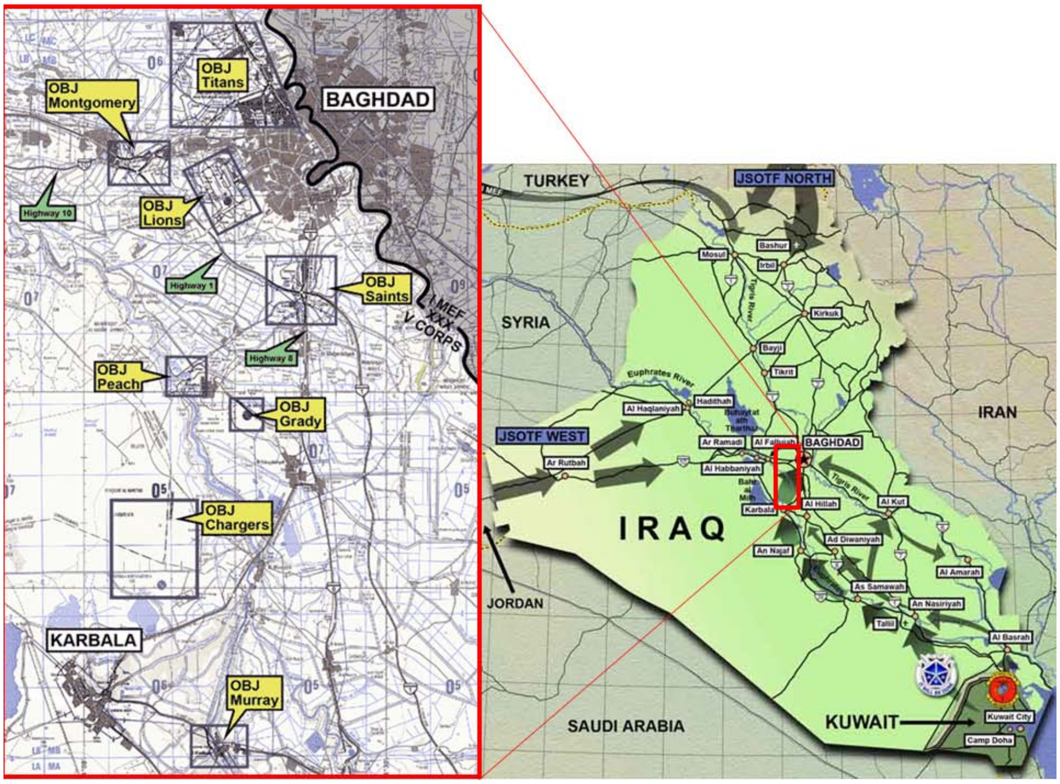

Figure 3. Objective CHARGERS in Vicinity of Karbala[24]

At the same time, the Corps' strategy is provided to the Combined Air Operations Center (CAOC), the senior command element of the air component. This allows the Strategy Division of the CAOC, also focused on events 96 hours in the future, to integrate the land component's operations and targets with the air component's operations and targets.[25] In developing the strategic air plan, the Strategy Division,

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[23] Kirkpatrick, "16 Days to Baghdad," 3.

[24] After: Gregory Fontenot, E.J. Degen, and David Tohn, "On Point—the United States Army in Operations Iraqi Freedom," (Fort Leavenworth, KS: Combined Studies Institute Press, 2004), 30 and 244, http://cgsc.leavenworth.army.mil/carl/download/csipubs/OnPointI.pdf, (accessed October 15, 2009).

[25] Air Force Tactics Techniques and Procedures (AFTTP) 3–3, *AOC Operational Employment—Air and Space Operations Center*, 1 November 2007, pp. 3–1 to 3–2.

supported by a number of intelligence representatives, identifies gaps in intelligence, targets that need to be imaged, or future enemy movements that must be determined. These gaps become the Commander's Critical Information Requirements (CCIR).[26] These requests for information (RFIs) are forwarded to the Analysis, Correlation, and Fusion (ACF) team of the Intelligence, Surveillance, and Reconnaissance Division (ISRD). Information that can be gleaned from available databases or previous ISR missions is returned to the Strategy Division to continue planning. Any remaining requirements that must be filled by ISR operations are submitted as collection requests to the ISR Operations team to be added to the Air Component Command's prioritized collection list of all other collection requests.[27]

Similarly, as part of its mission planning process, the V Corps Headquarters pushed a request for information through the collection manager (CM) for an updated order of battle (OB) for the 2nd Medina Division of the Republican Guard that was dug-in[28] in vicinity of OBJ Chargers just north of the city of Karbala. The intelligence on the disposition of the Medina Division and its battalions was incomplete, complicating planning for the 3ID and its supporting attack aviation elements.[29] The RFI could be answered with historical data but for current OB data, the RFI needed to be transformed into a collection request to task intelligence, surveillance, and reconnaissance assets to provide the latest information available.

As of 2003, the U.S. Army still had few organic ISR assets capable of providing such information. Long Range Surveillance Teams (LRSTs) could be tasked by the Division Military Intelligence Battalion to scout the area or the Combat Aviation Brigade could be similarly employed to identify forces currently on OBJ Chargers. The push for OBJ Chargers, however, was still three days in advance (the typical Corps planning focus) and those assets were required by the Division for planning and executing

[26] AFTTTP 3–8.

[27] AFTTP 3–3, 6–35.

[28] Carlo Kopp, "Iraqi Freedom—The Hammer & Anvil," *Australian Aviation*, May 2003, 34.

[29] Fontenot, Degen, and Tohn, "On Point," 180.

operations in the next 24 to 48 hours, to include seizing Objective Rams, the city of An Najaf.[30] For this reason, the collection request was forwarded by the Corps CM to Central Command.

22 March 2003: The collection request was compiled as part of the Land Component Command's prioritized collection list along with all other collection requests submitted by V Corps and by the 1st Marine Expeditionary Force (I MEF) that was advancing toward Baghdad along V Corps' eastern flank. This component list was then combined with the lists produced by the Maritime Component Command and the Air Component Command (ACC). Together, these lists were reviewed by the Joint Collection Management Board, which then produced a single Joint Integrated Prioritized Collection List (JIPCL) of all component requests, prioritized based on the Joint Forces Commander's established priorities.[31] The list was then forwarded to the ISRD of the CAOC located at Al Udied AB, Qatar.

The ISRD received the collection requests and collection managers specializing in specific intelligence disciplines[32] such as imagery intelligence (IMINT), signals intelligence (SIGINT), and measures and signatures intelligence (MASINT) reviewed the requests for appropriateness with regards to the systems capabilities to answer the requestor's question.[33] V Corps' request for current OB on OBJ Chargers could be initially satisfied by IMINT, possibly from a U-2 or unmanned RQ-4 Global Hawk (GH) (See Figure 4, Left: U-2S, Right: RQ-4 Global Hawk),[34] both of which are capable of imaging a target area using electro-optical, infrared, or radar imaging systems. To continue to provide updated OB over the next 72 hours, however, would require either

[30] Fontenot, Degen, and Tohn, "On Point," 101.

[31] AFTTP 3–3, 6–106.

[32] For further information on the intelligence disciplines discussed throughout this thesis, see Appendix A.

[33] AFTTP 3–3, 6–100.

[34] For further information on all ISR platforms discussed in this paper, see Appendix B.

numerous imagery passes over that time frame, images that might be better used to answer other requests, or once a baseline had been established, to simply track any additional vehicles that moved onto the objective.

Figure 4. Left: U-2S, Right: RQ-4 Global Hawk[35]

This latter consideration resulted in the ISRD tasking a GH to image the target initially and then to task the E-8 Joint Surveillance and Target Attack Radar System (JSTARS) (See Figure 5, Left: E-8C JSTARS; Right: MQ-1 Predator.) to monitor the objective area with its radar. The JSTARS radar is a ground moving target indicator (GMTI) allowing it to observe vehicles moving through an area.[36, 37] Its ability to provide precision locations is limited, but the ability to count individual vehicles and their general movements into and out of the objective area was sufficient to meet the needs of V Corps.

As 3ID continued to advance toward Objective Chargers, it began to plan its operations out for the next 72 hours and submited further collection requests through its division CM to the Corps CM to provide refined data on OBJ Chargers. These updates

[35] After: United States Air Force, "CENTAF Air Power Summary for April 3,2007," (photograph), http://www.af.mil/shared/media/photodb/photos/030411-F-0000J-222.jpg, (accessed November 20, 2009) and Jason Tudor, "Global Hawk, Global Mission," (photograph), http://www.af.mil/shared/media/photodb/photos/061003-F-7441T-333.jpg (accessed November 20, 2009).

[36] John Michael Loh, "Fly More Joint-STARS," *Army Times*, paragraph six, http://www.armytimes.com/community/opinion/airforce_backtalk_stars_060208/, (accessed May 15, 2009).

[37] As of 2009, North Grumman, which supports the JSTARS, has begun advertising a "Dismount Moving Target Indicator (DMTI) capability that can track non-vehicular, slow moving entities—even individuals." For an example, see *Air Force Times*, October 5, 2009, 11.

were forwarded to the ISRD which provided these more precise Essential Elements of Information (EEIs) to the JSTARS mission planning cell (a mixture of both Air Force and Army air crew)[38] to ensure that when they began their mission, they knew exactly what the Army required from their surveillance. Mission planning is often refined in this fashion as requirements from higher echelons provide a general concept of operations, where to focus attention, and the type of mission to be supported and then is updated by subordinate echelons as they are able to clarify their specific areas of focus and targets. In the meantime, the JSTARS was flying daily missions collecting against other target areas, providing overwatch for engaged Army and Marine Corps units to let them know about enemy tactical maneuvers and reinforcements. It also supported the "SCUD hunt" in the Western desert where the JSTARS radar was used to redirect RQ-1 Predator unmanned aerial vehicles (UAVs) (See Figure 5, Left: E-8C JSTARS; Right: MQ-1 Predator) and special operations forces (SOF) on the ground to suspicious "tracks" that may or may not be one of the many mobile missile launchers used by the Iraqi military.

Figure 5. Left: E-8C JSTARS, Right: MQ-1 Predator[39]

[38] Loh, "Joint-STARS," paragraph seven.

[39] After: Shane Cuomo, "JSTARS," (photograph), http://www.af.mil/shared/media/photodb/photos/021220-F-2034C-014.jpg (accessed November 20, 2009) and United States Air Force, "Dec. 17 airpower summary: Predators strike enemy forces," (photograph), http://www.af.mil/shared/media/photodb/photos/030813-F-8888W-206.jpg (accessed November 20, 2009).

23 March 2003: 48 hours prior to the assault on Objective Chargers, 3ID provided its plan and objectives to the Brigades to allow them to begin their own planning with the intention of achieving the Division's assigned objectives.[40] (See Figure 6, Joint Campaign Planning Timelines.)

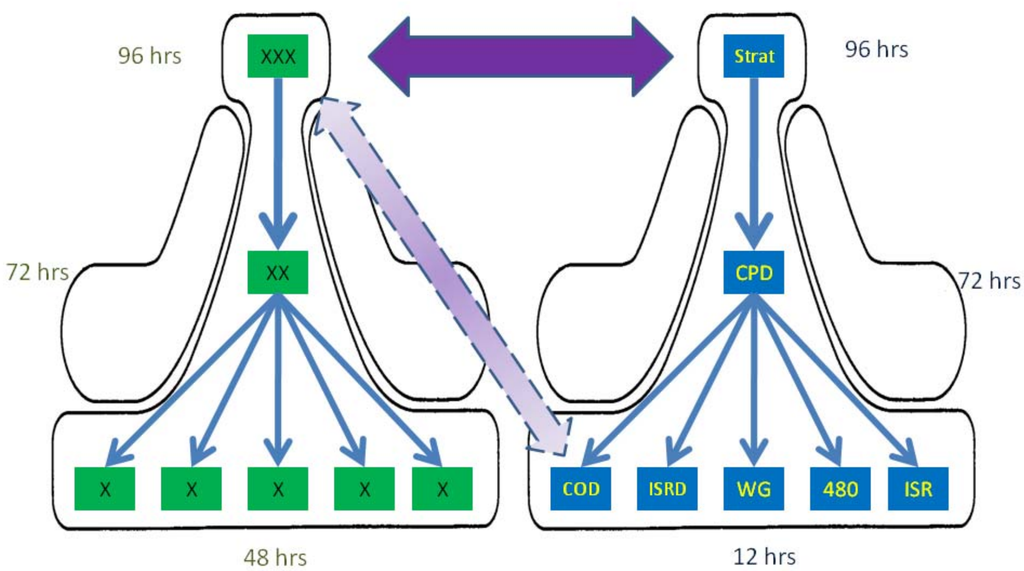

Figure 6. Joint Campaign Planning Timelines

The Military Intelligence Battalion, which in 2003 was attached to the Division, provided the intelligence necessary for the Brigades to conduct their planning, as the Brigades are subordinate to the Division and are attacking objectives assigned to them by the Division. It is important to understand the manner in which intelligence flowed from the Corps and Division down to the Brigades. At the start of Operation IRAQI FREEDOM (OIF), in 2003, the Brigade had very limited organic ISR capability. The Brigade S2 (intelligence staff), had no top secret/sensitive compartmented information communications, was inadequately staffed to conduct intelligence analysis, had limited human intelligence capabilities (both in terms of training and resources), and no properly

[40] FM 5–0, 1–24.

equipped signals intelligence (SIGINT) platoons.[41] At this phase of OIF, these limitations were not excessive and did not impact mission accomplishment because the intelligence information was provided from above to support missions directed from above.

As the Brigades planned their next 48 hours, the Combat Plans Division (CPD) of the CAOC developed the 48-hour air plan as well. To do so, the CPD built the Master Air Attack Plan (MAAP) that identified all the targets that must be struck to achieve the effects planned for by the Strategy Division. Strike packages were built, combining fighter and bomber aircraft with aircraft designed to defeat enemy air defenses, allowing for synergistic improvements in each element's mission. These packages were then aligned against specific groupings of targets, based largely on geographic proximity and the Joint Forces Commander's designated priorities. In conjunction with the CPD, the Intelligence, Surveillance, and Reconnaissance Division (ISRD) of the CAOC (See Figure 7, Divisions and Teams of the Combined Air And Space Operations Center [CAOC]) began developing the intelligence necessary to support these operations including both pre-strike intelligence (target photos, assessments of enemy air defenses, etc.) and post-strike intelligence to determine overall effectiveness of the strikes and whether the targets would need to be struck again or if the Strategy Division's envisioned effects were created. All of these intelligence requirements, as prioritized by the Joint Collection Management Board (JCMB), would be planned for, to include aligning specific ISR assets against the targets.[42]

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[41] Raymond T. Odierno, Nichole E. Brooks and Franco P. Mastracchio, "ISR Evolution in the Iraqi Theater," *Joint Forces Quarterly, 3* (50) (2008): 54.

[42] AFTTP 3–3, 4–37.

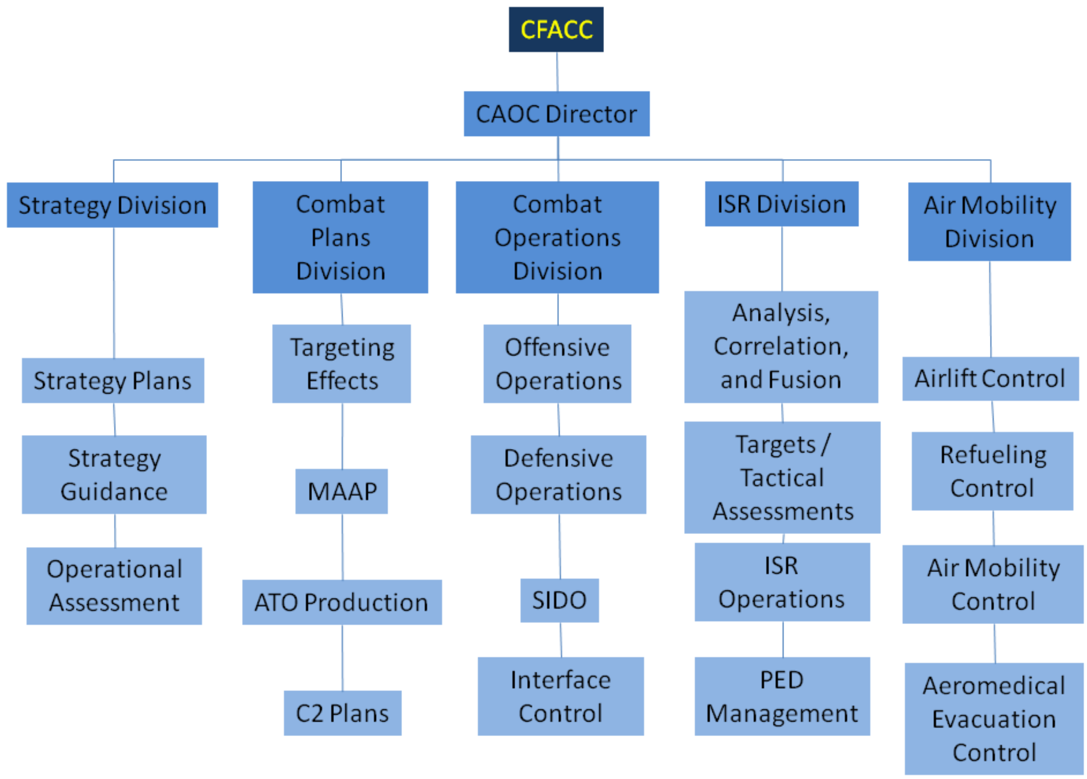

Figure 7. Divisions and Teams of the Combined Air And Space Operations Center (CAOC)[43]

The Brigades, during their planning, would identify targets that would need to be struck beyond the fire support coordination line (FSCL), which would be conducted by the air component as "air interdiction" missions as well as likely areas in which close air support would need to be coordinated by the Brigade or Battalion "joint terminal attack controllers" (JTACs). The CPD would add these targets and these CAS sorties to the air plan.

24 March 2003: As the BCTs finalized their plans, in coordination with their subordinate Battalions, additional targets or CAS requirements were be identified and forwarded up through the chain of command. The ISR plan, along with the plan for the

[43] U.S. Air Forces Central, "Combined Air and Space Operations," http://www.centraf.af.mil/units/caoc/index.asp (accessed October 23, 2009).

fighters, bombers, and other support aircraft, was combined into an Air Tasking Order (ATO). At 12 hours prior to execution, to the start of the "ATO day" (the 24 hours covered by each ATO), the air tasking order was sufficiently finalized to be passed to the Wings that owned the aircraft and pilots who would be flying the missions. The Wings would then begin planning their missions against the assigned targets.[44] These 12 hours allowed the individual aircrews to mission plan, determining specific routing, altitudes, and other considerations to best employ their aircraft.

During this final planning, as 3ID prepared to launch their assault on Objective Chargers, the "mother of all sand storms" struck, reducing visibility to 100 meters, which brought the Army advance to a stand-still and grounded the Division's aviation assets.[45] (See Figure 8, Sandstorm Impedes Operations.) Not only did this leave 3ID without the ability to prosecute targets on OBJ Chargers,[46] but it was unable to use its own scout helicopters to monitor the Iraqi forces on OBJ Chargers. Concerned that the Iraqi Army might attempt to use the cover provided by the sandstorm to reposition its forces, or worse, to initiate a pre-emptive attack against 3ID, the Division requested an immediate collection requirement for monitoring of the Iraqi forces.

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[44] AFTTP 3–3, 4–31.

[45] Kirkpatrick, "16 Days to Baghdad," 3.

[46] Steve Call, *Danger Close: Tactical Air Controllers in Afghanistan and Iraq,* (College Station, TX: Texas A&M University Press, 2007), 153.

Figure 8. Sandstorm Impedes Operations[47]

The JSTARS was already tasked to monitor the movement of the forces on OBJ Chargers, but its precision was insufficient to allow 3ID artillery assets to begin engaging targets or for ACC aircraft to be targeted against the Iraqi vehicles. The *ad hoc* (Latin "for this purpose," used to identify collection requests that occur after the air tasking order has already been issued) request was submitted by the V Corps CM directly to the Intelligence Surveillance And Reconnaissance Cell (ISARC) of the Combat Operations Division (COD). The COD is the division of the CAOC that monitors and adjusts the air plan in real time during the execution of the air tasking order that covers a 24-hour

[47] Fontenot, Degen, and Tohn, "On Point," 204.

period. The ISARC specifically monitors the execution of the ISR plan, adjusting the plan for delays in take-off, weather, maintenance problems, or as in this case, urgent requests for assistance.[48]

The ISR Operations Duty Officer (ISRODO), who leads the team of liaisons located in the ISARC, recognized that with less than 12 hours before the ATO was to begin execution, there was not enough time for the request to be passed to the collection managers of the ISRD to conduct their routine planning.[49] Instead, the ISRODO sent the request to the ISR Operations Cell in the ISRD which reviewed the list of available assets, the requirement of 3ID, and consulted with liaison officers from the various ISR platforms to establish the best possible solution to the Army's need. In this case, the ISR Ops team determined that the Global Hawk could be directed by the JSTARS crew to image specific parts of OBJ Chargers to provide highly precise coordinates, a more refined counting of the number of vehicles on the objective (whether moving or otherwise), and the massing of personnel (the JSTARS radar cannot detect people) either in encampments or possibly in some form of militarily relevant formations. This plan was returned to the ISRODO who along with the liaison officers conducts a "risk/gain" assessment[50] to determine what collection targets would be missed if the GH was diverted to this mission and whether any of those missed targets were of a higher priority than the 3ID request. Having established that such losses were acceptable, based on the Joint Force Commander (JFC)'s priorities, the ISRODO then forwarded this request to the Senior Intelligence Duty Officer (SIDO) on the COD floor who coordinated with the Senior Operations Duty Officer (SODO) who controlled all of the fighter and bomber aircraft and the Chief of Combat Operations (CCO) who represented the CFACC in day-to-day operations and decision making.[51]

[48] AFTTP 3–3, 5–45. (Note: Although the ISARC is specifically identified as a place and not a team according to this document, the ISARC is often referenced as a team.)

[49] Ibid., 5–66.

[50] Ibid.

[51] AFTTP 3–3.

The GH is a long endurance aircraft that is unhampered by crew rest issues that afflict aircraft with pilots and aircrew onboard. This allows the aircraft to remain aloft for many hours, often spanning more than one ATO day. In this case, the GH was already airborne, collecting on other targets when the mission crew located at Beale Air Force Base, California was notified of the ATO change from the COD. Although the GH had been tasked to image targets in support of future air interdiction missions and to provide Battle Damage Assessment (BDA) of previously struck targets, the GH crew was informed that the SIDO/CCO had established that the new targets were a higher priority and should be collected instead.

25 March 2003: The GH crew chatted directly with the JSTARS crew as they began surveying Objective Chargers. The JSTARS crew reported a large column of approximately 40 armored vehicles advancing on 3ID lead elements from An Najaf.[52] The JSTARS crew also identified locations along the roads where additional Iraqi vehicles from the north, rumored to be as many as 1,000, had left the roads and appeared to be attempting to move through the desert to surprise the 3ID located several miles to the south.[53] (For an example of GMTI, see Figure 9, Example GMTI Display.) The GH was rapidly directed to these locations and began taking infrared images that were unaffected by the sandstorm.[54] These images were forwarded to the Multi-Int Exploitation Cell (MEC) in the ISRD, made up of the Imagery Support Element (ISE) and the Air Force National Tactical Integration (AFNTI) team.[55] The ISE exploited the imagery and provided the SIDO with the coordinates of all imaged vehicles. The SIDO coordinated with the SODO for the tasking of fighter and bomber aircraft. Simultaneously, the images were delivered by the Battlefield Coordination Detachment (BCD), the Land Component Commander's representatives to the CAOC,[56] to the 3ID

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[52] Fontenot, Degen, and Tohn, "On Point," 159.

[53] Ibid., 164 and 167.

[54] John P. Jumper, (speech to the Air Force Association National Symposium on November 21, 2003 in Los Angeles, CA), www.afa.org/media%5Cscripts%5Cjumper1103.html, paragraph 23, (accessed May 15, 2009).

[55] AFTTP 3–3, 5–68.

[56] Ibid., 5–82.

tactical operations center (TOC) where the Division commander and his staff were able to quickly readjust their defensive positions and prepare to engage the maneuvering Iraqi forces. When the weather lifted, the battlespace had been sufficiently shaped for V Corps' final assault on Baghdad.[57]

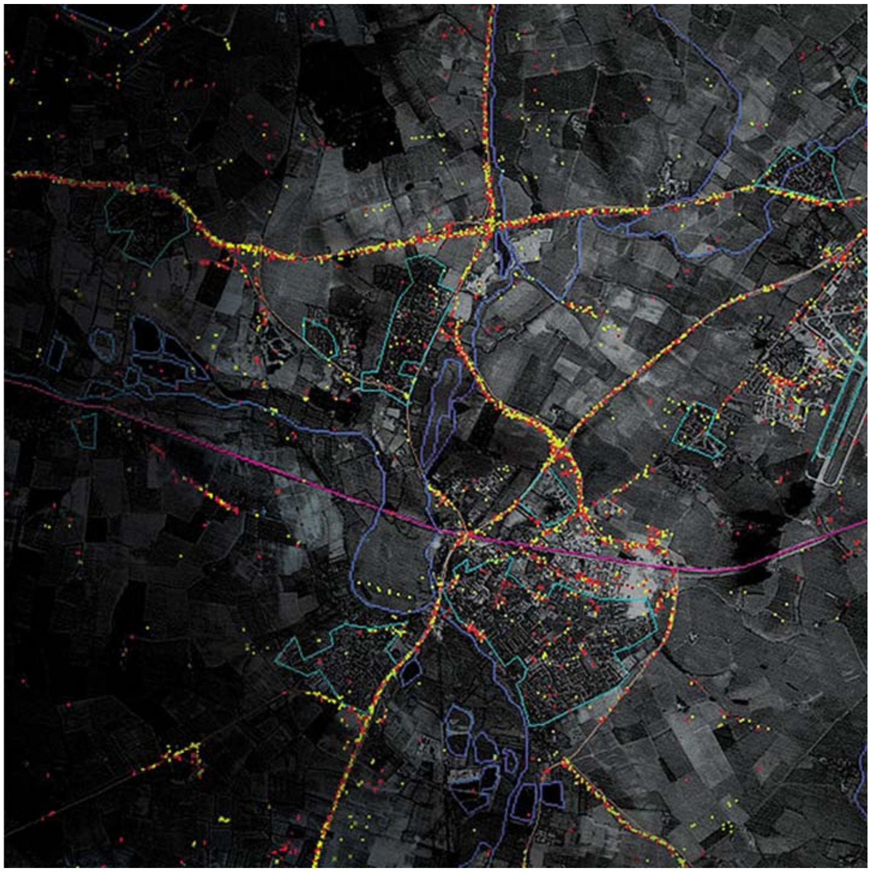

Figure 9. Example GMTI display[58]

2. CFACC ISR Adaptability within Design

The success of this organizational structure was clearly demonstrated during Operations Desert Storm and Iraqi Freedom. When facing other Machine Bureaucracies,

57 Fontenot, Degen, and Tohn, "On Point," 174.

58 From: Unknown source, "GMTI JSTARS," http://en.wikipedia.org/wiki/File:GMTI_JSTARS.jpg (accessed November 20, 2009), Yellow and pink diamonds indicate moving vehicles

in both cases the Iraqi Army, the U.S. military was able to plan and adapt faster than its opponents and coordinate more effectively prior to and during the execution of operations. It is likely that despite the weak capabilities of the Iraqi Army itself, the U.S. military (and its coalition partners) would achieve similar successes against any formally organized military structure.

CFACC ISR can be responsive. It can support the Army when used in the manner for which it was designed. By 24 March 2003, the U.S. military had advanced an incredible 220 miles,[59] much further than operational planning had suggested and overcame the previous benchmark of maneuver warfare success, the Nazi blitzkrieg of the Low Countries and France in 1940.[60] The U.S. Air Force and its ISR capabilities were able to adapt to this rapid advance and continued to support the U.S. Army. This was possible because the structure of the joint forces, and their planning, accounted for missions assigned from a central command authority, which were pushed down to direct actions against objectives prioritized by the Joint Forces Commander. Planning was conducted in parallel with refinements of those plans occurring as necessary when improved data was made available from subordinates. But even with subordinate input, the overall campaign plan changed very little.

As this scenario illustrates, there are processes in place that acknowledge the dynamic nature of warfare and the need to dynamically request and task assets as the situation develops. These processes, however, are intended to represent "the exception to the rule," allowing the machine bureaucracy to continue to function in a previously established pattern. When the pattern becomes interrupted and the organizational design is no longer appropriate to the given situation, such assumptions must be re-evaluated and the processes themselves redesigned to meet the realities of the situation.

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59 Kirkpatrick, "16 Days to Baghdad," 3.

60 Kopp, "Hammer and Anvil," 26.

D. U.S. ARMY ORGANIZATIONAL RE-DESIGN

1. Impetus for Change

Unfortunately, as Operations Iraqi Freedom and Enduring Freedom progressed, the U.S. military was no longer matched against similar Machine Bureaucracies. Instead, it found itself facing an increasing number of disparate organizations that were most likely organized as “simple” or “adhocracy” structures[61] depending on the specific nature of the “cell” and its affiliations (highly trained Saddam Fedayeen compared to poorly trained Jaish Al Mahdi or improvised explosive device (IED) cells vs. ambush teams). Most importantly, however, was the fact that there was no unified control structure (regardless of how decentralized it might be). There was simply more than one enemy at any given time, operating with its own objectives and doctrine, often in competition with other insurgent groups.[62] (See Figure 10, U.S. Army Faces Insurgent Forces.)

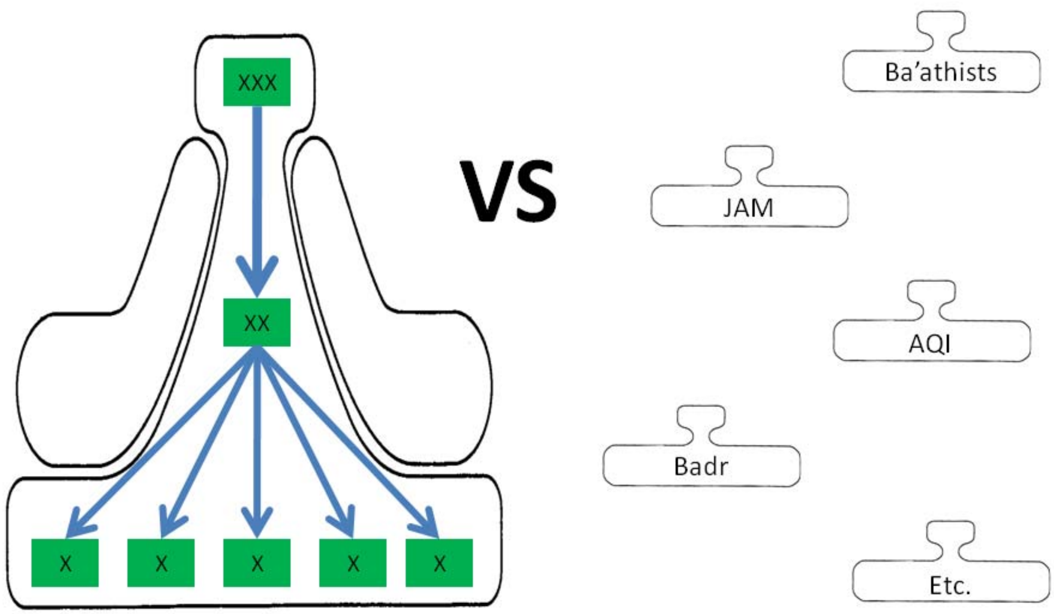

Figure 10. U.S. Army Faces Insurgent Forces

[61] Mintzberg, “Organization Design: Fit or Fashion?” 107.

[62] Odierno, Brooks, and Mastracchio, “ISR Evolution,” 52.

2. Transition from Division to BCT

In order to meet the more flexible and dynamic nature of these smaller organizations, the U.S. Army chose to shift the organization of its own components into one less like a Machine Bureaucracy and more along the lines of an Adhocracy. To this end, the Army began adapting the Army structure in 2005 to create modular "brigade based" units that were more responsive, better able to employ joint capabilities, enabled force packaging, and capable of fighting as a self-contained unit in non-linear, non-contiguous battlespace.[63] The Army intended to move away from units providing specific capabilities to ones that were able to create effects across a broader spectrum.[64]

Command and planning functions were decentralized as much as possible to the lowest level with Brigade Combat Teams being the "land owners" and companies often operating as independent organizations.[65] To help this structure survive, the U.S. Army pushed as many assets as possible down to the Brigade Combat Team level, most notably, re-assigning elements of the Division Military Intelligence Battalion to the Brigade Combat Team level or lower. This increased the BCT's analytic capability three fold and added twice as much human intelligence (HUMINT) capability. Each BCT was assigned an organic tactical UAV (Shadow) platoon to provide as much as 18 hours of full motion video (FMV) coverage a day. The SIGINT platoon in each BCT was better equipped and trained and further augmented by theater-level cryptologic support and SIGINT terminal guidance teams allowing them to tap into national capabilities. Furthermore, the bandwidth available to handle internal communications and to provide reachback to division and higher intelligence architectures was greatly increased.[66] This

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[63] DCS G-3, "Building Army Capabilities," (briefing presented at the Media Roundtable, Washington, DC, February 17, 2004), slide 5.

[64] Ibid., slide 6.

[65] Odierno, Brooks, and Mastracchio, "ISR Evolution," 53.

[66] Ibid., 54.

put imagery analysts, signals intelligence analysts, and other technical experts "closer to the fight;" it also provided each BCT with its own unmanned aerial reconnaissance systems for conducting operations.[67]

3. Impact

Most importantly, however, the manner in which operations were planned changed significantly. As noted above, during conventional operations, missions and objectives were pushed down from above with the Corps deciding where the fight was going to take place and against which elements of the enemy. In the subsequent scheme of operations, the Corps commander recognized that each insurgent group had to be dealt with individually and that without a central controlling authority unifying their efforts, the Army was hard pressed to control the action from above the BCT level. The Brigade Combat Team commanders were the experts on what needed to be done to defeat the enemy in their area of operations and they were given as much authority as possible to conduct those operations as they saw fit.

E. THE ADHOCRACY

The U.S. Army, in effect, created an adhocracy, an organizational structure optimized for innovation and the integration of experts from different specialties.[68] In the business world, the adhocracy serves as a temporary organization built around a specific project. When the project is completed, the members of the adhocracy return to their own organizations or become a part of a new project team. The Army, however, has chosen to institutionalize this structure by permanently assigning experts from within its own functional specialties and then adding in a temporary fashion, experts/liaisons from the joint, coalition, and interagency partners.

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[67] Odierno, Brooks, and Mastracchio, "ISR Evolution," 52.

[68] Mintzberg, "Organization Design: Fit or Fashion?", 111.

1. Basic Structure

The adhocracy has little formalization both in communications and the division of the organization. Job specialization is based on formal training and such specialists are not grouped together in functional areas but rather deployed throughout as parts of multi-disciplinary teams.[69] This type of task organizing (focused on a particular mission rather than a capability) allows different disciplines to be brought together to leverage one another's strengths and to mitigate one another's weaknesses.[70] Liaisons are highly integrated to insure mutual adjustment of processes, maintaining a balance throughout the organizational structure. Central authority is lacking as selective decentralization within teams throughout the organization is used to allow the teams, and the organization as a whole, to adjust more rapidly and efficiently to environmental changes.[71] Communication is key within an adhocracy as it allows team members to monitor implementation and ensure that plans are executed as they were agreed upon rather than relying on an external quality control process or guidance from leadership.[72] The adhocracy relies heavily on the specialized skills of experts that have been developed in training programs; however, adhocracies benefit from "team thinking" rather than reliance on a few individuals. In this fashion, multiple ideas can be generated, improved upon, and implemented, particularly in environments of such complexity that no one individual has the depth of knowledge or experience to solve the problem alone.[73] Adhocracies are designed to be temporary structures[74] to be re-created when the assigned mission ends and a new one begins.

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[69] Mintzberg, *Structure in Fives*, 254.

[70] Waterman, *Adhocracy*, 19.

[71] Mintzberg, *Structure in Fives*, 254.

[72] Waternman, *Adhocracy*, 20.

[73] Ibid.

[74] Mintzberg, *Structure in Fives*, 267.

2. Context for Effectiveness

Adhocracies are designed for situations that are dynamic and complex.[75] Such environments often feature problems that are unpredictable and not easily resolved by previously established and standardized solutions. Sophisticated technical systems, especially those that automate routine tasks, can be important conditions for the existence of the adhocracy.[76] Given that adhocracies do not adhere to the traditional hierarchical standard most in the military are familiar with, leadership is essential to seeing that they succeed. For any task force to be effective, it must be clear that the senior leaders recognize the importance of the adhocracy structure and empower it to operate with authority.[77] This has been crucial to the success of the U.S. Army's new BCT structure as each echelon of command understands that it is the BCT Commander's battlespace and the insurgency fight in that battlespace is his to win.

3. Limitations

The very nature of the adhocracy detracts from the possibility for unity of command.[78] For this reason, adhocracies tend to be inefficient as it is difficult to effectively coordinate singular purpose from the variety of multi-disciplinary teams.[79] Designed to deal with dynamic problems that do not have previously established solutions, each team within an adhocracy is likely to come up with its own unique solution to the problem. This may prevent identifying a priority solution and result in the expenditure of more resources across a variety of solutions rather than choosing one "best" solution and applying it across the board. Due to the informal nature of communication, and the use of vertical and horizontal links, adhocracies require more

75 Mintzberg, *Structure in Fives*, 267.

76 Ibid., 273.

77 Waterman *Adhocracy*, 28.

78 Mintzberg, *Structure in Fives*, 255.

79 Ibid., 277.

communication[80] than a Machine Bureaucracy, increasing the potential for miscommunication, conflicting messages, or misinterpretation.

F. JOINT PLANNING IN 2007

1. 12 June 2007—Chasing Black Marketers[81]

9 June 2007: 2–82 BCT has developed intelligence indicating there is a black market petrol stand operating within its area of operations. (See Figure 11, Red Circle Indicates 2–82 BCT's Area of Operations in June 2007.) Although it is suspected that based on the location of the stand and events in the area that the funds from the operation are being funneled to Jaish al Mahdi (JAM) operations, there is no concrete evidence of such ties. Rather, the black marketers represent a threat to the Government of Iraq’s (GOI’s) ability to provide basic services for the population. The black marketers are providing an alternative source for basic necessities, and in order for them to acquire the petrol they are either tapping into the oil pipelines or hijacking the fuel from GOI tankers. In either case, they are also limiting GOI’s ability to meet these basic needs. This does not appear to be a considerable threat to coalition forces in the area but the effect, when combined with other service related grievances in the area, is gradual deterioration of GOI legitimacy in the area, continued fanning of local grievances, and an environment of distrust for legal authorities.

[80] Mintzberg, *Structure in Fives*, 277.

[81] This mission is based on one that did in fact occur on 12 June 2007. The author observed the process as outlined here, though certain details have been altered to preserve operational security and to refine the narrative for ease of understanding.

Figure 11. Red Circle Indicates 2–82 BCT's Area of Operations in June 2007[82]

The commander of 2–82 BCT determines that the petrol peddlers must be apprehended. If there is a tie to insurgent activities, their capture could provide further access to the network that could result in further operations resulting in the defeat of the local insurgency and the improvement of the lives of the locals. Such operations, though not as glamorous as high value individual (HVI) raids, represent the fundamental aspect of

[82] Institute for the Study of War, “Map of Baghdad Neighborhoods,” www.understandingwar.org/files/Baghdad.jpg, (accessed October 23, 2009).

counterinsurgency operations: restoring government legitimacy, increasing government capabilities, reducing counter-government capacity, and interdicting the flow of resources to the insurgents. Additionally, as security is improved and grievances are resolved in an area, the available information necessary for stopping the insurgency generally improves.[83]

For this raid, the BCT would like to have full motion video (FMV) support to provide overwatch of the raiding force. Such overwatch would alert the soldiers to potential ambush locations, could follow any suspects that attempt to flee the objective area, and can help coordinate immediate fire support from either attack aviation or close air support assets. Unfortunately, it is understood that while these actions will help defeat the insurgency in this area, arresting black marketers is not one of the JFC's priorities, which means that FMV assets (in the form of either manned or unmanned aerial vehicles) from higher echelons are unlikely to be provided. The BCT therefore decides to task its own organic RQ-7B Shadow 200 UAV (See Figure 12, RQ-7B Shadow 200), despite its many known limitations, most notably, an audible signature that can often compromise missions.

[83] FM 3–24, para 3–128.

Figure 12. RQ-7B Shadow 200[84]

Understanding the importance of getting the right asset to support the mission, the BCT S2 requests higher echelon FMV support. Since two assets cannot be tasked against the same mission, and recognizing that this mission profile would not be of a high enough priority to get the asset, the S2 CM submits the request for FMV support for a counter-improvised explosive device (C-IED) mission. In 2007, C-IED was one of the highest priority missions as it was deemed necessary to protect the troops by finding the device before it could be detonated. The S2 CM, however, plans on swapping the Shadow for the higher echelon FMV asset to allow it to support the raid while the Shadow conducts the C-IED mission. The BCT commander, like many others, believes that eliminating the insurgency in the AO will eliminate the IED threat and that the reverse is not true. For this BCT, C-IED is a lower priority than taking actions that increase local support of the government and reduce their support for the insurgents.

[84] From: Amanda McBride, "A Shadow 200 RQ-7B," (photograph), http://www.army.mil/-images/2007/12/28/11688/army.mil-2007-12-28-083413.jpg (accessed November 20, 2009).

10 June 2007: The collection request is submitted through the proper channels and the Division and Corps collection managers approve the use of the Predator for the C-IED mission. The Predator would be available for the requested block of time. Prior to that, the Predator would be supporting a mission in another BCT area of operations and after the designated block of time, would transfer to a different mission in support of yet another BCT. The S2 for 2–82 is notified of this approval and begins to draw up plans for using the Predator to support the raid on the black marketeers.

11 June 2007: Each day, the 1st Cavalry (CAV) Division hosts a daily "effects synchronization meeting" that ensures that requests for fire support and ISR coverage have been met and are to be effectively used. The meeting reviews requests for attack aviation, close air support, and full motion video coverage and compares the requests against planned and predicted missions over the next two days. The meeting often requires a shifting of assets from one BCT to another as missions are completed early, are canceled because of a lack of intelligence or other required support, or new missions are added on short notice.

On this particular day, 1–1 CAV requests FMV support for monitoring of a threatened mosque in its area of operations. Since the mission does not require a particular amount of subtlety, and in fact may benefit from an unmistakable presence, the request is made for a Shadow UAV. 1–1 CAV's Shadow is tasked against another mission and cannot be spared for this surveillance. In reviewing the C-IED mission timeline (for which the Shadow is going to be swapped for the Predator), the 2–82 liaison realizes that their Shadow will not be needed for the full time of the mission (since it will be used in support of a route clearance team) and can be spared.

The Division CM agrees to the change and the 2–82 Shadow is tasked to support 1–1 CAV. When the 1–1 CAV mission is over, it will return to 2–82 to support the raid (though in actuality, the 2–82 liaison knows that it will support the C-IED mission and not the raid).

12 June 2007: When the Predator shows up on-station to support the C-IED mission, the Predator pilot (actually flying the aircraft remotely from Nellis AFB in Las

Vegas, Nevada) checks in with the BCT Joint Terminal Attack Controller, an Air Force airmen typically responsible for controlling Close Air Support aircraft, who confirms the Predator's altitude and that the airspace is clear of any other aircraft. The JTAC also informs the Predator pilot of the change in mission and that he will in fact be supporting a raid.

As the Predator pilot is briefed the new mission, he checks the distance of the target from the route that was supposed to be observed for IEDs and discovers that the new target is between 10–15 miles from the original location. Due to the slow speed of the Predator and the fact that this new distance will impact his ability to get to his next tasking and loiter time there, the Predator pilot requests that an *ad hoc* request be filed for the new target. Mission planning to this point had prepared the Predator crew for a different timeline and the new distances may prevent the Predator from supporting other units.

The JTAC coordinates with the S2 CM to get the *ad hoc* submitted. The *ad hoc* is sent to the Division, which recognizes the problem and chastises the S2 for not accurately portraying the Predator mission but forwards the request to the Corps. Likewise, the Corps critiques the misuse of the asset for a mission other than the one it was tasked for but also passes the request to the ISARC at the CAOC.

The ISRODO reviews the change in mission and the distance to the new target. Based on coordination with the Predator liaison, it becomes apparent that the new target area will delay the asset's availability to its follow-on tasking and will limit the amount of time it can spend supporting that next mission. For this reason, the ISRODO denies the *ad hoc* request and the Predator is pulled to support another higher priority mission (based on the JFC's priorities).

In losing the Predator, the 2–82 S2 is unable to use its own organic Shadow UAV because it is already supporting 1–1 CAV at this point. The amount of time that has transpired in getting the request through the chain of command prevents the Shadow from making it to the raid even if it was released by 1–1 CAV. The 2–82 Chief of Operations

(CHOPS) who is responsible for overseeing daily operations as the representative for the BCT commander, approves the mission going ahead without FMV support.

The raid succeeds and four black marketers are captured on the objective with little resistance. During tactical questioning, it is revealed that the black marketers provide their funds to a local financier who is known to be supporting an IED cell in the local area. The captives indicate that while he changes residences on a regular basis, they know the financier's location for that night. CHOPS directs the raiding team to immediately conduct a raid on the next target.

Without FMV support, however, they are unable to effectively plan the mission. At the very least, they need to know how many vehicles are in the compound where the financier is staying, whether there are any obstacles along the road to the compound, and if there are any observable ambush positions along the route. Having FMV support would allow them to sweep the route to the target and the target area prior to the raid.

At approximately this same time, the JTAC is contacted by DRAGOON 21, the pilot of a U-2 as it enters the 2–82 battlespace. The U-2 pilot provides a quick summary of his capabilities explaining that he is equipped with a radar for the night, giving him the ability to take images of the area at night and through the weather if necessary. The imagery is not ideal but it could still answer most of the raiding team's questions. The S2 CM asks the JTAC to request an image from the U-2. The U-2 pilot, who does not actually control the radar, forwards the request to his Mission Operations Controller located at Distributed Ground Station One (DGS-1) at Langley AFB, Virginia.

The Mission Operations Commander (MOC) is able to contact the JTAC via chat on the Secure Internet Protocol Network (SIPRnet) allowing them to pass classified information back and forth regarding the requested image. The MOC says the target can be collected without adversely impacting the target deck of the U-2, so long as the BCT or Division imagery analysts can "exploit" the image instead of the DGS-1 analysts. Officially, an *ad hoc* request must be submitted for administrative purposes.

The *ad hoc* request is forwarded to the Division, which agrees to exploit the image when it is received. The Division forwards the request to the Corps, which

recommends denying the request, fearing that the U-2 can only take so many images and adding this image may cause it to drop other targets. Still, the Corps CM forwards the request to the CAOC to ensure that the image will not drop other targets. The ISARC chief receives the request and asks the DGS liaison officer if the image would adversely impact the target deck.

The DGS liaison officer calls the MOC at DGS-1 to ask about the "risk/gain" assessment to confirm that no targets will be lost for this new image. The MOC (who is already in contact with the JTAC) explains that since the Army will exploit the image and not the DGS analysts, the target will not impact the U-2 mission. The DGS liaison provides this information to the ISRODO who informs the SIDO. The SIDO, therefore, recommends to the CCO that the target be added to the collection deck. The CCO agrees and the MOC and the Corps CM are notified simultaneously that the image has been approved.

Unfortunately, during the time that the request was pushed up the chain-of-command and discussed at each level, the U-2 continued its mission and left the 2–82 airspace. The MOC notifies the JTAC that the target had been approved but that the aircraft was no longer available. "Wish we could have helped."[85]

2. What Went Wrong and Why?

This mission in particular highlights the shortcomings of the Air Component Command's ability to rapidly adjust to the dynamics of the counterinsurgency campaign. While the Army had specifically transitioned to a more streamlined organizational structure, the CFACC maintained a machine bureaucracy that dictated a request and coordination process that was extremely hierarchical and heavily reliant on vertical linkages. Furthermore, the fundamental assumptions of the CFACC process (priorities

[85] In reality, the image was taken before the *ad hoc* was submitted. By the time the approval had been provided, the image had already been exploited revealing a vehicle blocking the route of travel but no vehicles observable within the compound. The BCT was very thankful for the support provided by the DGS through its violation of established and formalized procedures and all recognized that the process could have prevented the mission from occurring.

established by the JFC, 72 hour planning cycle in parallel with the Army, *ad hoc* as exception rather than rule) were often incorrect, impacting the effectiveness of the support that the CFACC provided.

One of the key points highlighted by the June 2007 mission was the inability of the collection process to align itself with counterinsurgency doctrine. While each BCT commander was given responsibility for dealing with the roots of the insurgency within their own area of operations (AO), the collection process still relied on priorities pushed from the top down. In this case, C-IED missions were prioritized Corps-wide over those missions that the BCT commander thought would have a greater impact on the insurgency in his area of operations (which would likely be different from the priorities of other BCT commanders in their AOs).

Although not specified in this example, the Predator *ad hoc* had to be approved by the CAOC regardless of what units were involved. For example, had the subsequent BCT that would have received the Predator support also been subordinate to the 1st Cavalry Division, the Division still would not have the authority to approve the mission, even if it believed the 2–82 mission was of a higher priority within its Division AO. Had the follow-on BCT belonged to another Division, the Corps would not have had the authority to approve the change despite the Corps Commander's priorities. This highlights the need for *ad hoc* approval authority to be assigned to the lowest applicable level with the CAOC *monitoring* all changes to allow for management of finite resources.

The fact that the BCT had been assigned the Predator was not as important as the fact that the Predator had been assigned a *target* in the BCT area of operations. In other words, the Predator was not there to support the BCT but rather to collect on a specific target. This emphasizes the difference in how the CFACC approaches the COIN campaign and how the Army approaches it. The BCT commander is given the responsibility of dealing with the insurgency in his area of operations and to that end, the Corps and the Division provide the assets necessary to support the BCT commander. The Corps and Division understand that the needs of each BCT commander will likely be different from one another and that a BCT mission may change dynamically as the

battlespace or the BCT commander's understanding of it changes. The CFACC views the campaign as a series of targets, the successful "servicing" of which is the metric upon which effectiveness is determined.

Overall, the process is too extended to be effective. Too many unnecessary echelons are required to sign off on changes to the plan. The mechanisms by which such changes are made (primarily through e-mail and phone calls) are too limited to permit rapid understanding and situational awareness development to occur among multiple echelons simultaneously. The fact that the DGS MOC was the de facto decision maker but had to be coordinated with after all other echelons had been consulted significantly delayed the process. Putting the right people in touch with one another via carefully crafted horizontal linkages and giving them the authority to act on these interactions would have more effectively and efficiently resolved the issues involved.

Additionally, the Army's transition affected not only real time execution but the very nature of how planning was conducted between joint partners. Under the new paradigm, the Division and, in turn, the Corps, became little more than force providers. Rather than tell the Brigade Combat Teams how to use the forces they pushed to them, the Division awaited requests from the BCT and then provided assets as necessary (assuming those assets were not already "organic" to the BCTs based on the previous realignment of forces). If the Division was unable to meet the needs of the BCT, a request was forwarded to the Crops commander to provide additional support. Should they be unable to fill those requirements, the request was pushed to the Air and Space Operations Center. (See Figure 13, BCT Focused Joint Planning.)

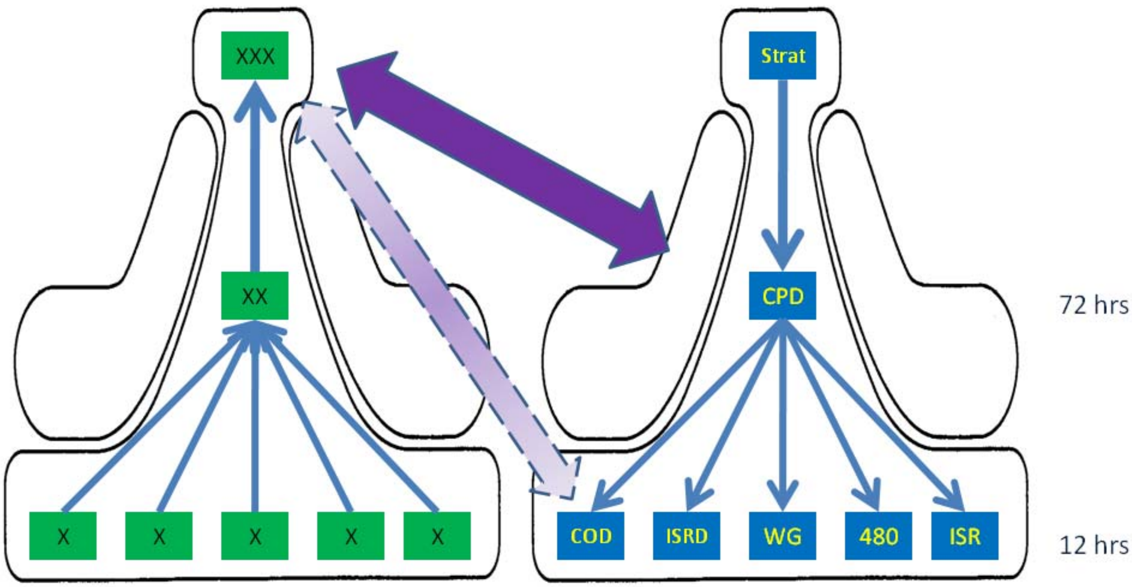

Figure 13. BCT Focused Joint Planning

It is apparent that what was once a "parallel" planning and execution cycle between the land and air components became a "sequential" process. The air component was largely unable to predict what targets needed to be struck or collected (in the case of ISR assets) until the Brigade Combat Teams had already formalized their plans and sent their requests up channel. Previously, the BCTs benefitted from an air plan that was largely complete and needed only minor refinements from the BCT's specific information. Now, the BCTs were the starting point for the planning and, in their opinion, the air component was unforgivably behind the planning curve.

Per doctrine, the air component has a 72 hour Air Tasking Order cycle based upon the need to identify targets to be struck/influenced/collected upon, develop those targets sufficiently to understand what munitions/sensors are required to accomplish the mission, and to begin assigning assets to each target. (See Figure 14, Air Tasking Order (ATO) Cycle.) In turn, these assets belong to units that must assign actual aircraft to the mission, aircrew to fly the mission, and conduct their own mission planning to get to and from the target safely and with the support necessary to survive. When conducted in

parallel with Corps, Division, and Brigade Combat Team planning cycles, the 72-hour ATO cycle is largely transparent to the BCTs. When they requested air support in some fashion or another, such support was readily available because it had been anticipated based upon the planning of higher echelons. In the subsequent counterinsurgency fight, focused on the BCT as the lead element, the 72-hour ATO cycle was unable to begin until the BCT was able to provide its plans. The BCTs had been designed to, and had always, focused on operations to occur within the next 24 to 48 hours. In fact, many of the operations carried out during counterinsurgency operations were planned and executed in as little as 12 hours, which was significantly shorter than what the CAOC was capable of planning for given the unmodified nature of its organization.

Figure 14. Air Tasking Order (ATO) Cycle[86]

86 Joint Publication 3–56.1, *Command and Control for Joint Air Operations*, November 14, 1994, Chap. 4.

The air component remains a Machine Bureaucracy explicitly for the benefits of efficiency. As the CAOC is responsible for air operations in Iraq, Afghanistan, and the Horn of Africa (See Figure 15, U.S. AFCENT Area of Responsibility), it must carefully balance a number of "high demand, low density" assets to include air refueling assets, bombers, and certain ISR assets that must support all three theaters of operation. The limited number of resources largely negates the concept of pushing assets down to lower levels as the Army was able to do with Corps and Division assets. (Although, this has occurred to a large extent with the more numerous Predator UAVs, which are able to be tasked down to the Division if not BCT level.) This balancing of assets takes considerable time and planning and accounts for the 72 hours that an ATO takes to produce. The Air Force simply cannot satisfy all three theaters at the same time, and it relies on guidance from the Joint Forces Commander to establish priority for support. This leads to a "time share" situation in which certain assets are sent to Iraq for a number of days, then to Afghanistan for a few days, and then to the Horn of Africa for a few days. Planners must also take into account maintenance stand-down days in which the aircraft cannot fly to allow them to be properly inspected and repaired as necessary. Of course, which days the aircraft flies in which theater depends on the requirements of those that are being supported. The air component must know in advance which ground components are going to be launching operations in the near future so that the right assets can be overhead in preparation for or during those operations. Failure to provide sufficient lead time for planning often resulted in the desired asset (the U-2, Global Hawk, JSTARS, etc.) being in the wrong theater at the time of need.

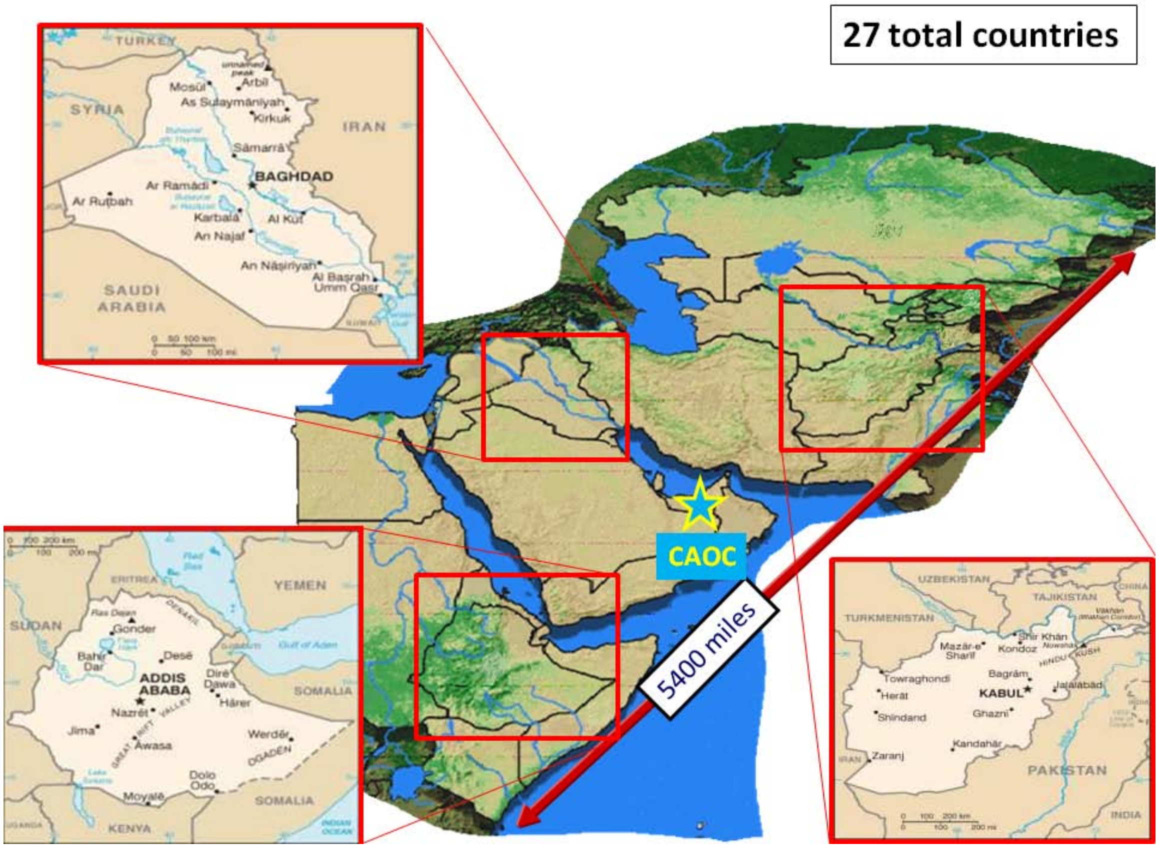

Figure 15. U.S. AFCENT Area of Responsibility[87]

In order to operate in a more responsive manner, the air component needs the ability to anticipate land component requirements in sufficient time to conduct planning in parallel with (as opposed to sequentially after) the Brigade Combat Team planning staff. Additionally, the air component needs a way to decentralize authority as much as possible to allow flexibility in operations once execution has commenced. Again, because of the limited number of air assets available, decentralization of authority over such assets was a significant obstacle. Each asset would be required to service the needs of multiple BCTs and decisions made by one BCT would likely have catastrophic impacts on other Brigade Combat Teams.

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[87] After: Norm Eckert, "Armed Forces Communications and Electronics Association," Presentation for AF Forces/A6 Deputy Director, May 28, 2008.

G. SUMMARY AND CONCLUSION

Fortunately, many of the organizational problems highlighted in this chapter have already been addressed. Various solutions have been enacted at different echelons, credited to the many hard working junior officers in all services as they attempt to overcome the inertia of their organizations and the restrictions of their doctrine. But these solutions are largely piece-meal affairs that lack formalization and are susceptible to personality-based disruptions. Despite the glowing praise from the U.S. Army with regards to some of these changes and the Air Force's continued adaptation to the COIN environment, the overall Air Force structure is poorly designed, an ill-fit, for the counterinsurgency campaign. Though limited by resource availability and a requirement to support three theaters of operations simultaneously, the Air Force has yet to make the significant steps necessary to adopt an adhocracy type organizational structure. Without such a development, the USAF, and in particular its ISR community, is unable to provide the flexibility and diversity required to support on-going operations as seen today.

What this chapter has highlighted is a requirement for better organizational design. This design should focus on integration with joint and coalition partners to improve integration. This integration will be most beneficial in the planning and tasking process in order to reverse the trend towards sequential planning between the supported commander and the CFACC. Finally, the re-organized ISR structure must shorten the approval process to account for the abbreviated planning timelines dictated by the decentralized authority of low-echelon commanders.

Chapter II will further analyze the problems associated with ISR conducted in support of counterinsurgency operations. While the Army's reorganization and the resultant disconnect between the land and air component commanders needs to be addressed, solving that problem alone will not be sufficient for improving overall ISR effectiveness. Chapter II will explain how differences between conventional and counterinsurgency operations significantly complicate the employment of ISR.

II. COIN ISR AS A WICKED PROBLEM

A. INTRODUCTION

As discussed in the first chapter, organizational re-structuring is a necessary component of meeting the needs of counterinsurgency (COIN) intelligence, surveillance, and reconnaissance (ISR) planning, tasking, and execution, but it is not sufficient for alleviating many of the current problems complicating the employment of Combined Forces Air Component Commander (CFACC) ISR in support of COIN operations. In response to the de-synchronization of the joint planning cycle created by the U.S. Army's 2005 transformation, some authors have proposed delegating planning and command functions of air component assets to subordinate levels, such as the Air Component Coordination Element (ACCE), to improve timeliness. This recommendation, however, fails to address the greater problems of ISR within a COIN campaign. While it may be possible to reduce the planning timelines by changing the level of planning and tasking authority, it is unlikely to significantly increase the effectiveness or more importantly (at least in the eyes of the U.S. Air Force), increase the efficiencies of the limited number of available ISR assets.

The CFACC may tolerate a certain amount of inefficiency, but to be effective the CFACC must move beyond simply pushing decision making lower. Making decisions faster improves the responsiveness of ISR, but making the right decisions makes ISR effective. Re-organizing alone could simply lead to making the wrong decisions faster and with frequent, incorrect, course changes. To be both responsive and effective, organizational redesign must be accompanied with increased interaction in all efforts to resolve ISR problems.

This chapter will identify the problems associated with the use of assets, doctrine, and processes developed for conventional operations when dealing with a COIN campaign. By explaining the differences between ISR requirements for a conventional conflict and those for a COIN environment, this chapter will highlight the problems that true reorganization will need to address to be effective.

B. WICKED ISR PROBLEMS

The limiting factor to success through simple organizational structure changes is the current inability to recognize ISR problems in counterinsurgency as being different from ISR problems in a conventional situation. In a conventional fight, decisions tend to be straightforward with clear/measurable results. But decisions in a COIN campaign are considerably more difficult as there is rarely a "right" solution. Instead, solutions must balance competing interests, limited resources, and conflicting objectives. While the same ISR assets are going to be tasked and generally the same ISR effects will be requested, the similarities end there. To understand the differing contexts, one must be familiar with the notion of "wicked problems."

"Tame" problems represent those problems with which scientists and engineers have usually dealt[88] through a process of gathering data, analyzing the available data, developing a solution to a defined problem, and then implementing that solution.[89] The key to the tame problem is that the mission of the problem (the goal of solving it) is clear. Likewise, it is equally clear when the problem has been solved. It must be understood that the term "tame" is not meant to imply that a problem is "simple" as tame problems can be very technically complex in their solution.[90] For example, putting a man on the moon would essentially be a "tame" problem as the goal was clear (landing a man safely on the moon) and there was a clear point of success (the astronaut returned from having landed on the moon to safely splashing down on earth), yet the process of getting the man to the moon and back was incredibly complex and technically demanding.[91] In fact, most

[88] Horst W. J. Rittel and Melvin M. Webber, "Dilemmas in a General Theory of Planning," *Policy of Sciences* 4 (1973): 160.

[89] Jeff Conklin, "The Age of Design," Cognexus Institute, 2001, 9, www.cognexus.org, (accessed April 01, 2009).

[90] Jeff Conklin, "Wicked Problems and Social Complexity," *Dialogue Mapping: Building Shared Understanding of Wicked Problems,* (Hoboken, NJ: John Wiley & Sons, 2005), 11.

[91] Ibid., 11.

people understand that the more complex a tame problem is, the more important it becomes to follow the orderly flow of gathering and analyzing data, formulating the solution and the implementing it.[92]

Such a method for solving ISR problems is clearly illustrated in the *Theater ISR CONOPS* in discussions of ISR Operational Art and the Design Method for Joint ISR planning. The intent of this guidance is to help ISR planners to convert Strategy into specific ISR Objectives that will achieve clearly worded ISR Effects broken out into quantifiable ISR Tasks and Actions.[93] This logical progression helps to ensure the proper weight of effort is applied to higher priority ISR problems and that at the end of execution, effectiveness can be objectively measured. Such an approach is ideally suited to a conventional ISR problem that can be easily defined and solved (despite the complexity of that solution) and is driven from the top down.

In contrast, a wicked problem is one that lacks either of these clear-cut issues: a desired solution and the ability to know when that solution has been reached.[94] Wicked problems tend to be present in any policy issue specifically because there will be different needs to be satisfied, and it is often difficult to "please everyone." More importantly, however, is the fact that all of these different "stakeholders," individuals or "group[s] within or outside an organization that has a stake in the organizations' performance"[95] and who will be affected by this problem's resolution, may not agree on what the actual problem is or that the solution that is reached is the solution to the problem or simply a solution to an associated problem or symptom. While wicked problems are also often technically complex, it is the fact that they are also socially complex[96] that makes them difficult, if not impossible, to tame and therefore establish a clear goal that can be identified has having been solved. It should be noted that wicked and tame are not binary

[92] Conklin, "Wicked Problems and Social Complexity," 5.

[93] *Theater ISR CONOPS*, (Washington, DC: Headquarters Department of the Air Force/A2CP), 2007.

[94] Rittel and Webber, "Dilemmas," 160.

[95] Daft, *Essentials of Organization Theory and Design*, 64.

[96] Conklin, "Age of Design," 11.

labels. Rather, problems tend to have a degree of wickedness that indicates the level of difficulty in establishing clear goals and the requirement for increased social integration in the resolution of such problems.[97]

Unlike the "Strategy to Task" model espoused by the *Theater ISR CONOPS*, a wicked problem (such as those ISR problems encountered during COIN operations) is often described in terms of "solution elements." The understanding of the problem only develops from creating possible solutions and evaluating how they will work, what additional problems they may cause, or what previously unobserved issues become highlighted with each possible solution. In such cases, understanding of the problem will continue well into the execution of the solution, requiring the ability to adjust the solution to the new understandings of the problem *during implementation.*[98]

C. ISR AS TAME AND WICKED PROBLEMS

With an understanding that few problems are entirely "tame," in comparing the requirements for conducting intelligence, surveillance and reconnaissance missions in support of conventional and counter insurgency campaigns, the former is likely to be "tamer" than the latter. This can be made apparent by the comparison of the ten criteria typically used to define wicked problems.[99]

1. Formulation

Tame problems are most easily characterized by the fact that one can provide a comprehensive definition of the problem. If there are multiple interested parties in a problem, all agree that the problem definition is accurate.

Conventional ISR is typically tasked with finding the enemy.[100] In March 2003, CFACC ISR was tasked with two primary missions: locate Iraq's mobile missile

[97] Conklin, "Wicked Problems and Social Complexity," 11.

[98] Ibid., 6.

[99] Rittel and Webber, "Dilemmas," 160.

[100] Downey and Guvendiren, "Collection Management," 12.

launchers (the SCUD, see Figure 16, SCUD Transporter Erector and Launcher [TEL]) and, as illustrated in the example in Chapter I, find the 2nd Medina Division of the Republican Guard. This problem, in and of itself, is simple: find a specific enemy unit. Finding a SCUD missile transporter, erector and launcher (TEL) in the western deserts of Iraq during Operation Desert Storm was a tame problem, though more complex and difficult than finding the Medina Division located at Objective CHARGERS. A tame problem allows planners to move directly from the problem recognition (find the 2nd Medina Division) directly to resolution (task the JSTARS to monitor Obj CHARGERS).[101]

[101] Matthijs Hisschemoller and Robe Hoppe, "Coping with Intractable Controversies: the Case for Problem Structuring in Policy Design and Analysis," *Knowledge and Policy: The International Journal of Knowledge Transfer and Utilization* 8 (4) (Winter 1995-1996): 51.

Figure 16. SCUD Transporter Erector and Launcher (TEL)[102]

For wicked problems, there is no clear-cut definition of the problem. In fact, understanding the problem requires solutions be developed so that further understanding of the problem can begin. Each solution will require additional information and this information will highlight problems with the solution. "The formulation of the wicked problem IS the problem!"[103]

In its broadest terms, the use of ISR in a COIN campaign highlights this inability to define the problem. Using the June 2007 example from Chapter I, the ISR problem in supporting COIN operations lends itself to considerably more wickedness. Finding the

102 From: BBC, "Behind the Fence," http://www.bbc.co.uk/cumbria/content/image_galleries/spadeadam_20050824_gallery.shtml?18, (accessed October 25, 2009).

103 Rittel and Webber, "Dilemmas," 161.

black marketers was a simple problem, but was doing so the solution to the Brigade Combat Team (BCT)'s insurgency problem? The 2–82 BCT commander did not think so, he believed the solution to his insurgency was in restoring the legitimacy of the Government of Iraq (GOI) in providing basic services to the people within his area of operations (AO). To this end, finding the black marketers was a step in the right direction, but then going after the financier to whom they provided their ill-gotten money was the next step. The problem's wickedness is defined by the constant series of "next steps" (taking down the financier leads to intelligence on the improvised explosive cell that he funds, which leads to information on the insurgent leadership in the area, which, when eliminated, creates a power vacuum to be filled by new insurgent groups, which leads to "turf wars" in the neighborhood.) As each step is taken, the BCT commander and his staff must constantly reassess what effects (intentional and otherwise) their efforts are having and how they must adapt their plan based on new information. Developing a long-term campaign plan, as is done for conventional operations, is extremely difficult if not impossible to do specifically because of these unforeseen consequences. This requires a constant dialogue between the BCT commander and his staff as well as with the ISR assets and analysts that are updating his understanding of the AO.

A wicked problem can actually get worse as attempts are made to solve it. This becomes increasingly likely if forced to adhere to an inflexible long-term plan. All attempts to solve a wicked problem must, by their very nature, be seen as interim steps to a better solution. This requires the ability to adapt and change in the process, despite previously established plans.

2. Stopping Rules

For a tame problem, there are criteria that establish when the problem solvers (in this case, the CFACC's ISR elements) have successfully accomplished their mission. There is a clear stopping point that delineates success and failure.

Conventional ISR either finds the 2nd Medina Division before it engages 3ID or it does not. In the case of the SCUD TELs, ISR very often did not find them until after they had already fired their missiles. Whether successful or not, it is clear when the problem has reached its conclusion.

A wicked problem has no prescribed stopping point. Given that understanding the problem is improved as the solution is developed, the closer the solution gets to being finished, the more the solver understands the problem and realizes the solution is insufficient. There are no clear criteria that establish when all the stakeholders in a problem have been satisfied, the problem solver can always attempt to do better to please more of the stakeholders.[104]

When will ISR in the 2–82 Commander's COIN campaign be considered effective? When it has identified all of the black market gas stations in the AO? When it has found all of the supported financiers? When it has been sufficiently planned and scheduled to provide "unblinking" coverage of a particular neighborhood?

In the tame problem, the ISR mission was done when it found the Medina Division or when the last SCUD had been targeted. Even if it were to take several years for that to happen, it was possible for the ISR mission to one day be considered complete. Not so with ISR in COIN when the more planners understand about the problem, the more they realize they have to continually "massage" their strategy to incorporate new information or shifting goals.

3. Test for Correctness

Similarly, it is possible to identify whether the "tame" mission was successful or not because criteria can be assigned for assessment purposes. One can therefore objectively decide whether the offered solution is correct or false.[105] Such criteria may have to be refined to limit "gray areas" but ultimately, such criteria can in fact be developed.

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104 Rittel and Webber, "Dilemmas," 162.

105 Ibid.

The ground commander requesting ISR support typically provides a last time information of value (LTIOV) date that establishes when ISR must determine the location of the Medina Division or the SCUD TEL. This time may be when 3ID is prepared to launch its offensive on Obj CHARGERS or may be more flexible and limited simply to "prior to launch" with regards to the SCUD TEL. If the LTIOV has passed and ISR has been unable to provide the location for the Medina Division or the SCUD TEL, then the mission has failed. If the location has been provided prior to the LTIOV, the mission succeeds. In the event that the SCUD TEL was located prior to it launching but not in sufficient time for strike aircraft to target it before it launched, ISR may be considered to have successfully fulfilled its mission but future criteria will be refined to include finding the SCUD TEL before it reaches a launch site or before elevating its missile into launch position in order for strike aircraft to have sufficient time to reach the target before launch. While this may add some "wickedness" to the SCUD hunt problem, there is a clear criteria that can eventually be developed for this problem, suggesting that it is generally tame.

There is not likely to be a solution that is judged by all to be the "correct" solution when dealing with wicked problems. There will be compromises made between all parties. Some stakeholders will feel that their problems were addressed, even insufficiently so, while others will believe that their considerations were completely marginalized. Each stakeholder will have his or her own criteria for judging if the solution was successful or not and the inability to identify a clear problem suggests that all stakeholders will have equally valid reasons to assert their criteria. For example, the Iraqi police may be satisfied that the black market cell was captured, reducing crime in the neighborhood, but the Iraqi people who depended on them for oil are suffering because of their reduced access to fuel.

The Processing, Exploitation, and Dissemination team in the Intelligence, Surveillance, and Reconnaissance Division (ISRD) at the Combined Air and Space Operations Center (CAOC) is responsible for evaluating the successfulness of ISR missions. Often, this success is tied to a certain quantifiable number such as the number of hours flown or the number of images taken. But most recognize this as being ill-suited

for judging the mission's success. So efforts are made to confirm that the ISR assets answer all of the essential elements of information (EEIs), the questions asked by the requestor that the ISR asset is expected to answer. But when these EEIs are answered but the customer claims to still not be satisfied, it becomes apparent that this too fails to effectively asses the effectiveness of the mission.

4. Solution Types

Not only can criteria be established as to when the tame solution has been reached (based on an established timeline or some other criteria) and the solution can be objectively evaluated, but the solution can be determined to be clearly the "right" or "wrong" solution.

The current propagation of full-motion video (FMV) assets such as the U.S. Air Force's unmanned aerial vehicle (UAV) the Predator is due in large part to the inability to find the SCUD TELs during Desert Storm. It was determined based on established, objective criteria, that imagery intelligence (IMINT) for example was the "wrong" answer. It was unable to locate SCUD TELs in sufficient time for strike aircraft to be effective. Similarly, signals intelligence (SIGINT) based either on the ability to detect radar emissions that were associated with pre-launch operations or communications intercepted directing the launch were also "wrong" in that they did not provide consistent detection of the SCUD TEL or its location.

In the run up to the 2003 invasion of Iraq, the continued threat of SCUD launches forced the U.S. Air Force, working with its joint and coalition partners, to develop a "right" solution for the problem. This involved the development of tactics, techniques, and procedures for combining SIGINT, specialized IMINT, and FMV with search techniques used by U.S. Air Force strike aircraft and joint/coalition special operations to find the SCUD TELs before they launched.

Tame problems reflect the notion of a bureaucratic direction of problem solving based on "unambiguous distribution of competence."[106] The intelligence community has

[106] Hisschemoller and Hoppe, "Coping with Intractable Controversies," 55.

spent decades perfecting the ability to "bean count," that is to track large numbers of tanks and associated equipment. But counterinsurgency operations are considerably less well-studied and even in the study of COIN in general, there are few "experts" with regards to a particular insurgency in a specific country. This adds to the wickedness of the problem and complicates finding the "right" solution to the problem. At best, a solution to a wicked problem can be judged as being better than or worse than other solutions. Or it might simply be "good enough" given the circumstances. It is not possible for a wicked problem to have a "right" answer for the simple fact that not all stakeholders agree to the same problem statement.

For COIN ISR, there is a constant attempt to balance the land component's request for more ISR and more flexible tasking processes with the air component's need to manage the fleet of ISR assets and ensure that they are being used as efficiently as possible. Yet neither side is happy with the results, driving the Land Component Commander (LCC) to purchase its own FMV assets and distributing them as organic assets to the brigades and the Air Component Command (ACC) pushing back against what it feels to be ineffectual uses of its ISR assets.

5. Trial and Error

Devising a solution to a tame problem, depending on its level of complexity, may involve a considerable amount of trial and error. Whether these trial runs are conducted in training/experimental situations or against real world cases, there are few if any repercussions for the trial aside from the consequences of failure.

In searching for the SCUD TEL in western Iraq, the U.S. intelligence community could take as many images of the desert as it deemed necessary to locate the SCUD. Although this limited the ability to image other targets (and was therefore a "cost"), the fact that imagery succeeded or failed to find the SCUD TEL did not impact its ability later to find the SCUD or for other solutions to be similarly attempted. There was no impact to the target, the SCUD itself, when the image was taken and therefore, did not alter the chances of finding the SCUD.

Every solution to a wicked problem is a "one-shot operation" and every attempt counts significantly as it will have repercussions on the problem. Every attempt at a solution will leave a "trace" which is irreparable. Furthermore, the consequences are likely to be long term, which means that solutions must be weighed carefully before being implemented.[107] Unfortunately, because the problem definition cannot be refined without looking at the available solutions, failure to implement a solution can stunt the learning process with regards to the problem.

In capturing the black market oil smugglers, 2–82 was able to gain valuable intelligence with regards to the network that the oil sales funded to include the location of an insurgent financier. Unfortunately, because 2–82 was unable to capture the financier the same night that the black marketers were captured, he was able to change his sleeping locations in the future and to discard his cell phone, which he would have suspected of being compromised by the capture of his associates. So by solving one problem, capturing illegal oil sellers, the BCT made their ability to capture the financier harder. In order to survive in the future, the financier is likely to increase his vigilance, change locations more frequently, and rely less on regular communications with his subordinates.

6. Exhaustible Set of Solutions

Tame problems can be solved by one or more of a limited number of available options or some combination of those options. There are a finite set of rules, tools, or options that can be accounted for, more or less rigorously depending on the specific discipline.[108]

As is made abundantly clear by the air component, there is a "low density" of "high demand" ISR assets. Therefore, there are only so many available options available for the solving of a problem. While these assets can be combined to increase their effectiveness, they are still limited in numbers, available aircrew, and acceptable usage times (based on times of day, weather, or required maintenance).

[107] Rittel and Webber, "Dilemmas," 163.

[108] Ibid., 164.

Furthermore, there are "rules" which limit the problem itself such as the impact of terrain on mobility. An intelligence analyst, given the last known location of the 2nd Medina Division of the Republican Guard, can predict its rate of travel over a given terrain and then plan for the optimal positioning of ISR assets to confirm the progress of the Division.[109] While other factors, such as air interdiction attacks against the Medina Division, unexpected maintenance problems, or a particularly motivated unit could alter the rate of travel to some degree, the overall bounds of the problem are manageable. While the SCUD TEL is also bounded by rates of travel, it is further hampered by the requirement to launch only from very specific launch areas based upon the inclination of the launch area and the level of surface porousness to support the weight of the SCUD TEL.

As it is difficult for all to agree on the definition of the wicked problem, it is not possible to assess all of the available solutions to the problem. As the understanding of the problem increases, the number of available solutions increases. But it is unlikely, when dealing with a wicked problem, that all possible solutions will be identified for the simple fact that the problem cannot be sufficiently understood to be bounded. Even with the available list of solutions available, a judgment call must still be made with regards to the ability of the solution to satisfy the most number of stakeholders and the possible consequences of the solutions as to which solution should be enacted.

With regards to the black marketers, if the problem is understood as simply capturing the criminals, using FMV from a Shadow is a good solution. But if the problem is expanded to include taking down the network, the requirement for ISR may expand to include multi-night observations of the smuggling routine to observe via JSTARS ground moving target indications (GMTI) what locations the smugglers go to and from (likely to include where they hide their oil supplies and to whom they give their money) and to listen to their communications with other insurgent cell members requiring SIGINT support. If the problem is then further expanded to include restoring GOI capability to provide needed fuel to the community, GMTI may be further tasked to

[109] Guvendiren and Downey, "PIR Development," 7.

identify the best place for fuel stations based on high traffic areas and measurements and signatures intelligence (MASINT) in the form of multi-spectral imagery may be required to identify locations of leaks in the oil pipelines to establish where smugglers were stealing their fuel and where repairs need to be made. Further problem refinement will increase the number of ISR capabilities that may be required or might be sufficient for meeting the needs of the BCT.

7. Unique

Tame problems lend themselves to templating. The solution for one problem may be used to solve other problems of a similar nature. Therefore, "principles of solution" can be developed to fit a particular problem class.[110] Standardized tactics, techniques, and procedures (TTPs) can be developed for dealing with all problems in that associated class.

For the 2nd Medina Division, there is an established template based on Iraqi doctrine that provides for the number of vehicles in the Division, their spacing within the column, and the location of certain key assets within the Division to include command vehicles and air defense assets. (See Figure 17, Example Template of an Iraqi Army Division, Highlighting the Advanced Guard.) Understanding the template for a Republic Guard Division allows the intelligence analyst to plan for effective and efficient ISR missions. It is not necessary to have FMV coverage *and* IMINT *and* SIGINT of the Medina Division as it moves toward Objective CHARGERS. Rather, if a SIGINT asset reports the location of some of the Division's air defense equipment, the analyst can essentially map out where the rest of the Division is located on the map using the air defense locations as starting points for the template. Or, if an imagery asset captures a picture of lead vehicles from the Division passing through a choke point at a known time, the analyst can then work forward in time based on the typical rate of movement of Iraqi Republican Guard divisions and predict where the key targets of the 2nd Medina Division

[110] Rittel and Webber, "Dilemmas," 164.

will be located at any future point in time. This has the effect of limiting the number of ISR assets that must be tasked against the same problem while still answering the required question.

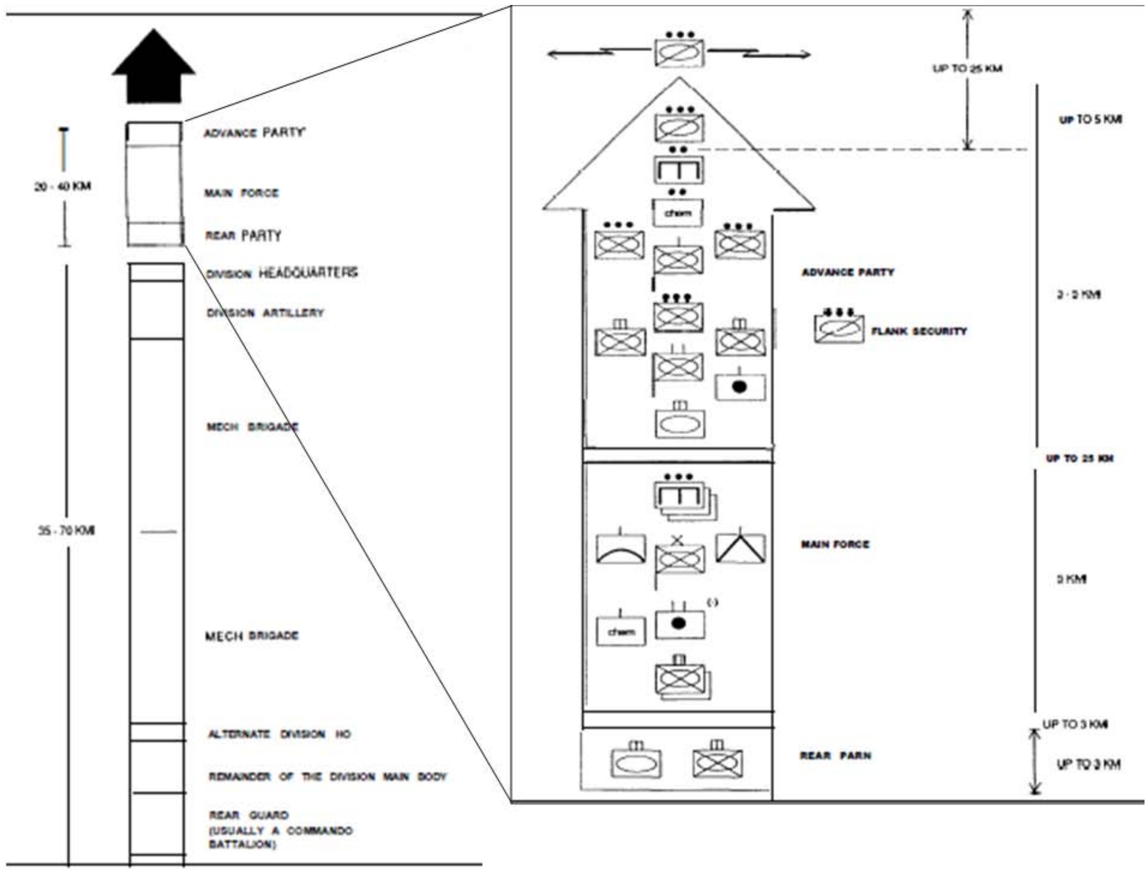

Figure 17. Example Template of an Iraqi Army Division, Highlighting the Advanced Guard[111]

Learning to search for SCUD TELs in Iraq allows for the development of TTPs for finding any highly mobile target. This particular process was codified in joint doctrine as "the dynamic targeting process" and is made up of six steps: Find, Fix, Track, Target, Engage and Assess (F2T2EA).[112] This process has been used to find

[111] S2 of the 177th Armored Brigade and the Operations Group of the National Training Center, "The Iraqi Army: Organization and Tactics," *Handbook 100–91*, Ft Irwin, CA: National Training Center, January 3, 1991, 62–63.

[112] Joint Publication 3–60, *Joint Targeting*, April 13, 2007, p. I-4.

SCUD TELs, SA-6s, and even maritime threats. The templates and the TTPs are modified based on the different “rules” that affect each target set but the classes of targets are still the same.

Unlike a tame problem that lends itself to “problem classes” and therefore the development of templates and TTPs, each wicked problem is essentially unique despite any similarities to other problems.[113] The unique characteristics of each problem make it difficult to be certain[114] that the similarities are sufficient to warrant the use of similar TTPs or the application of a particular template.

ISR problems in a COIN campaign may appear similar such as the case of the black marketer cell. Each insurgent cell is likely to have a financier, a leader, and a team of operators but how those “nodes” are interconnected, how they communicate with one another, how they transfer assets between one another is unique to each cell. Some cells may appear to be more similar to others because they are of the same sect, live in the same general neighborhoods or because they share the same financier, but such similarities are not enough to allow assumptions that would result in the development of a template or the recycling of a successful TTP.

8. Symptom or Problem

For tame problems, it is possible to establish a root cause or contributing factor to the problem. This root cause can then be addressed in order to develop a solution to the problem. A problem can also be described as having a “natural level” at which it must be addressed. By focusing on addressing a “higher” level of the problem, the solution is likely to be too broad for the solution to be effective.[115]

The ground commander requesting ISR support is typically dealing with his comparable counterpart. Therefore, the U.S. Army 3rd Infantry Division commander is looking for the 2nd Medina Division. ISR assets that report back having found the Iraqi

[113] Rittel and Webber, “Dilemmas,” 164.

[114] Ibid., 165.

[115] Ibid.

Corps headquarters have not met the intent of the ground commander's request because knowing where the Corps is located does not provide enough granularity to find the opposing division.

There may be cases where different solutions are required to address problems at different levels but that is exactly what they are, different problems. Stopping the SCUD TEL before it launches is one problem, preventing the order to be sent out to the SCUD TELs to go to their launch sites is a different problem. While solving the individual SCUD TEL problem may appear to be less efficient than targeting the higher headquarters issuing the orders, if the SCUD elements are operating based on pre-planned operations orders that require no further guidance, attacking the headquarters element, a problem at a "higher" level, does not solve the problem at the individual SCUD TEL level.

Each wicked problem can be assessed to be the symptom of a larger more complex problem. Furthermore, additional assessment reveals that each higher level problem is the symptom of yet another problem. Yet, the higher one attempts to solve the problem, the broader the solution must be and therefore the less effective it becomes.[116]

The improvised explosive device (IED) defeat effort is a perfect example of this wickedness. Many have decried the attempts to detect only the device, suggesting that it would be far more effective to track the IED emplacement teams. Yet these teams operate infrequently and may not be made up of permanent members. Therefore, it is suggested that to defeat the IED problem, one must tackle the network of bomb makers, material suppliers, and financiers. The ingenuity of the adversary, however, has demonstrated an ability to make bombs from readily available chemicals, to find new bomb makers quickly after old ones have been captured or killed, and to tap into a variety of financial resources to off-set the loss of a single financier.

Others have argued that the IED problem is just a symptom of the much larger insurgency and that to focus on the IED or even its associated networks is to only treat

[116] Rittel and Webber, "Dilemmas,"164.

the symptom which will continue to reappear until the insurgency is crushed.[117] Students of contemporary counterinsurgency doctrine are quick to point out that all insurgencies are local and that counterinsurgents cannot hunt down and kill every insurgent. Rather, one must tackle the underlying causes of the insurgency to eliminate that problem which leads to a population-centric campaign.

For this reason, each ground commander will have his own perspective as to where he needs ISR and what he wants it to do. Some will require ISR to search the roads in front of his convoys to warn them of emplaced IEDs. Others will layer ISR in an effort to find emplacement teams and then follow them back to their networks. Still others, such as 2–82 BCT's commander, will use ISR to monitor the security of the population, attempting to secure their confidence in the psychological campaign against the insurgents by improving their lives and the capacity of the GOI. None of these requests is "wrong" or "right," and some are only "better" within the specific context of that ground commander's particular area of operations.

9. Discrepancy

A single causal explanation for a tame problem can be identified. Addressing this cause will end the problem. The inability to solve a problem can be traced back to a particular limitation.

Although the U.S. military has developed the F2T2EA process for dealing with the problem class of highly mobile targets, the inability to successfully find SCUD TELs or SA-6s can be traced back to the inability to get target information to strike assets in a timely enough manner. Additionally, the lack of FMV assets during Desert Storm limited the ability of ISR to search areas in real time versus image them hours prior to the information being required. When SA-6s (See Figure 18, SA-6 Surface to Air Missile Launcher) in Kosovo went untargeted, it was largely because assets that had identified

[117] Downey and Guvendiren, "Collection Management," 6.

the location of the SA-6 were unable to transmit the information directly to strike assets. By the time the information was made available, the mobile air defense missile system had already departed the area.

Figure 18. SA-6 Surface to Air Missile Launcher[118]

Again, simply because a problem is tame does not mean it is not technically complex or that all of the available elements required for the solution are available. It is simply means that a solution can be identified and can be judged successful when executed.

There are likely many causes for a particular wicked problem. Depending on which cause is identified will indicate the preferred solution. In fact, the reverse is also true. Based on the particular capabilities available, the cause of the problem may be defined as something for which there is an available solution. The perspective of a

[118] Gulflink Office of the Special Assistant for Gulf War Illness, "Military Equipment of the Former USSR," http://www.gulflink.osd.mil, (accessed October 23, 2009).

particular stakeholder, largely based on their own capabilities, will determine how they explain the cause of the problem and this in turn will influence the solution they expect to see in answer to the problem.[119]

The CFACC has been pushing early in the campaign to focus on the IED networks. Justified as "getting left of boom," meaning to take actions before an IED is detonated rather than reactively after, the CFACC is entirely sincere in his interest in defeating the IED problem.[120] But seeing the IED network as the cause of the IED problem is largely contingent upon the fact that the CFACC's ISR assets are optimized for tracking and taking down networks versus locating a single IED in an urban environment or supporting the security requirements of a population-centric COIN campaign. Since the solution that the CFACC is able to provide is the answer to the IED *network* problem, then the IED defeat problem must be defined as eliminating the network. This is not wrong, it is simply one perspective and therefore one solution to the problem.

10. Right to Be Wrong

In the scientific realm, which is the basis for the solutions of all tame problems, researchers are allowed to be wrong. In fact, it is considered equally valuable to prove a hypothesis wrong as to prove it right.[121]

With regards to the Medina Division, an intelligence analyst makes multiple predictions of the Division's location referred to as courses of action (COAs). ISR is then used to confirm the location of the Division at one or more of those COAs. Proving that the Division is not executing COA 1 strengthens the case that it is following COA 2

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[119] Rittel and Webber, "Dilemmas," 166.

[120] Michael Fabey, "UAVs, Other Aircraft Being Misused, ACC Chief Says," *Aerospace Daily & Defense Report,* June 21, 2007, http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=defense&id=news/UAVS062107.xml, (accessed May 29, 2009).

[121] Rittel and Webber, "Dilemmas," 166-167.

and therefore in a different location. It is therefore acceptable for the ISR assets to "fail" to find the Division at one location because doing so indicates that it is at another location.

Issues arise when there are too many COAs available and insufficient ISR assets to address them. While the Medina Division may be limited to three routes along which to travel and the air component may only have enough ISR to check two of those COAs, the inability of ISR to detect the Division along those two routes indicates that the Division must be along the third route. Unfortunately, when searching for SCUD TELs, the absence of a SCUD TEL at one site means it could be at any one of hundreds of other sites. Therefore, failing to find the SCUD TEL in this case does not significantly improve the chances of finding the SCUD TEL. This does not make it a wicked problem, however, as the problem of finding the SCUD TEL is still sufficiently defined. It is simply a resource problem (a matter of "technical complexity") that prevents failures from being useful.

Dealing with wicked problems means suffering the consequence of every attempt to solve the problem. Furthermore, since there is no "right" answer to the problem, the ability to satisfy the greatest number of stakeholders is the driving factor. Therefore, there is no opportunity to be wrong because the consequences created by a poor solution will impact different stakeholders and possibly eliminate other solutions.

In requesting a Predator, 2–82 was denying the use of that asset to other BCT commanders. When the Predator was then re-tasked by 2–82 to perform a mission other than the one for which it had been tasked, the Predator was pulled and given to another unit that had a higher priority mission. That higher priority mission may not have been possible to execute because in being denied the Predator originally, the BCT had turned away other assets such as Close Air Support (CAS) and attack aviation. When the Predator is given to the unit after it is taken from 2–82, the receiving BCT no longer has the CAS and attack aviation assets it required for its mission. Therefore, incorrectly (from the Corps/CAOC perspective) assigning the Predator to 2–82 eliminated a solution for another BCT.

Table 1, Comparison of Characteristics of Wicked and Tame Problems, summarizes the differences between wicked and tame problems.

Table 1. Comparison of Characteristics of Wicked and Tame Problems[122]

Characteristic	Tame Problem	Wicked Problem
Formulation	Definitive –An exhaustive description of the problem can be made such that a solution can be formulated.	Not Definitive –Each solution requires more information or information from a different perspective. The formulation of the problem IS the problem.
Stopping Rules	Yes –The problem solver knows when a tame problem is complete.	No –The process of solving the problem helps understand its nature. There may always be a "better" solution.
Test for Correctness	Yes –Can be evaluated on how good the solution is.	No –Generates waves of consequences over an extended period of time that can never be fully understood.
Solution Types	True/False Right/Wrong	Good/Bad/Better/Worse/Good Enough –Solution may be a result of limited time / assets (the best that can be done).
Trial and Error	Encouraged –Multiple attempts at solutions can be tried without penalty.	Discouraged –Every solution attempt has irreversible effects on some group or persons. Compromises sources or tips off the target.
Exhaustible set of solutions	Yes –All solutions may be described and attempted.	No –Nor is there a well-described set of permissible operations that may be incorporated into the plan.
Unique	No –Problem "classes" exist with solution principles for the class. It is possible to build "templates" of the problem / solution.	Yes –There are no problem "classes." Solution principles cannot be developed to fit all members of the class.
Symptom or Problem	Problem –There are natural levels of a problem.	Symptom –There is no natural level. The higher the level of a problem's formulation, the broader and more general it becomes.
Discrepancy	One causal explanation.	Multiple explanations –The choice of explanation determines the nature of the problem's resolution.
Right to be Wrong	Yes–To prove a hypothesis wrong is just as valuable information as proving a theory right.	No –The aim is not to find the truth but to improve some community characteristic. Wrong answers have consequences within the affected community.

[122] After: Nancy Roberts, "A Table Comparing Characteristics of Wicked and Tame Problems," hand out for DA4302 "Wicked Problems," Spring 2009.

D. TAMING THE ISR PROBLEM?

Due to the difficulties in “solving” a wicked problem, many people and organizations, when they encounter a wicked problem, simply attempt to “tame it,” that is make it into a tame problem based on a number of different techniques or approaches. The most common of these within the military is to “appeal to higher authority” as in the case of basing ISR objectives on the Joint Force Commander (JFC)’s guidance and intent.[123] As noted in Chapter I, however, the BCT commander is in fact the customer who must establish guidance. But there is only one JFC and there are many BCT commanders. This can also allow individuals or organizations to avoid trying to solve the problem by allowing them to simply follow higher authority orders[124] or even explaining that they answered all of the EEIs, the latter displaces blame because the EEIs were not accurate reflections of the customer’s needs rather than working directly with the customer to establish actual needs versus capabilities. Such a strategy reduces the number of stakeholders involved in the decision-making process and therefore decreases the complexity of the problem. Typically, this results in authorities and “experts” looking for solutions only within their own experiences and capabilities, possibly overlooking much more effective solutions.[125]

Other tactics for taming a wicked problem include locking down the problem definition or specifying parameters by which to judge success.[126] In both of these cases, the intent is to focus on those parts of the problem that can be easily defined and for which an easily measured solution can be applied. This, of course, ignores the fact that the new “problem” to be solved is only one small part or symptom of the actual problem. Lastly, solution options can be limited to a very few which in turn leads to reframing the

[123] *Theater ISR CONOPS*, 6.

[124] Conklin, “Wicked Problems and Social Complexity,” 13.

[125] Nancy Roberts, “Coping with Wicked Problems: the Case of Afghanistan,” *Learning from International Public Management Reform* Volume 11B (2001): 357–358.

[126] Conklin, “Wicked Problems and Social Complexity,” 12–13.

problem as "either/or" problems such as either providing persistent surveillance of high priority targets or simply reacting inefficiently to every *ad hoc* request that is submitted.

Ultimately, taming a wicked problem fails. Short-term solutions may be possible and limited duration success can be experienced, but the problem does not go away and may actually worsen in the long run.[127] It is therefore necessary to recognize that a wicked problem exists and that the key to solving it is to deal with the social complexity of the problem. This will require the collaboration of many distinct and sometimes competing groups in order to reach a resolution of the problem that satisfies as many concerns as possible.[128]

E. RESOLVING WICKED PROBLEMS

1. Create a Shared Understanding of the Problem

With regards to "effectiveness approaches," it is not sufficient to look at only "part of the story." Rather, contemporary approaches to measuring effectiveness use an integrative approach that includes stakeholders and competing values, acknowledging that because organizations tend to do many things, they have many different outcomes and therefore must be judged effective on not one but many different measures of effectiveness.[129] To begin with, it is necessary to evaluate the organization's effectiveness with regards to the needs and requirements of its stakeholders. It therefore becomes essential to identify those groups who have needs or requirements to be met by the reorganization of the USAF ISR community for a COIN environment.

Brigade Combat Team commanders: The mission of a BCT engaged in counterinsurgency operations is considerably different from one engaged in conventional combat operations. Less focused on engaging the enemy in order to accomplish higher-headquarters directed objectives, the BCT commander in the COIN environment is forced

[127] Conklin, "Wicked Problems and Social Complexity," 13.

[128] Ibid., 14.

[129] Richard Daft, *Essentials of Organization Theory and Design*, (Cincinnati, OH: South-Western College Publishing, 1998), 64.

to deal with an array of military, civil, and political problems. Such problems might include establishing clean water and power supplies to a community, providing security for a very important person (VIP) or resupply convoy moving through his battlespace, monitoring a demonstration or pilgrimage for threats to the marchers, or dealing with any number of different insurgent attacks (IEDs, artillery fire, troops in contact, etc.). Each of these missions require ISR coverage to a different degree, and the BCT commander on the ground needs to be able to make the decision on how best to allocate and employ those assets.[130] (See Figure 19, BCT Commander Problem Sets.) For the BCT commander, the "ISR problem" is one of responsiveness, having an ISR asset available when needed to look at the targets that will impact his decisions.

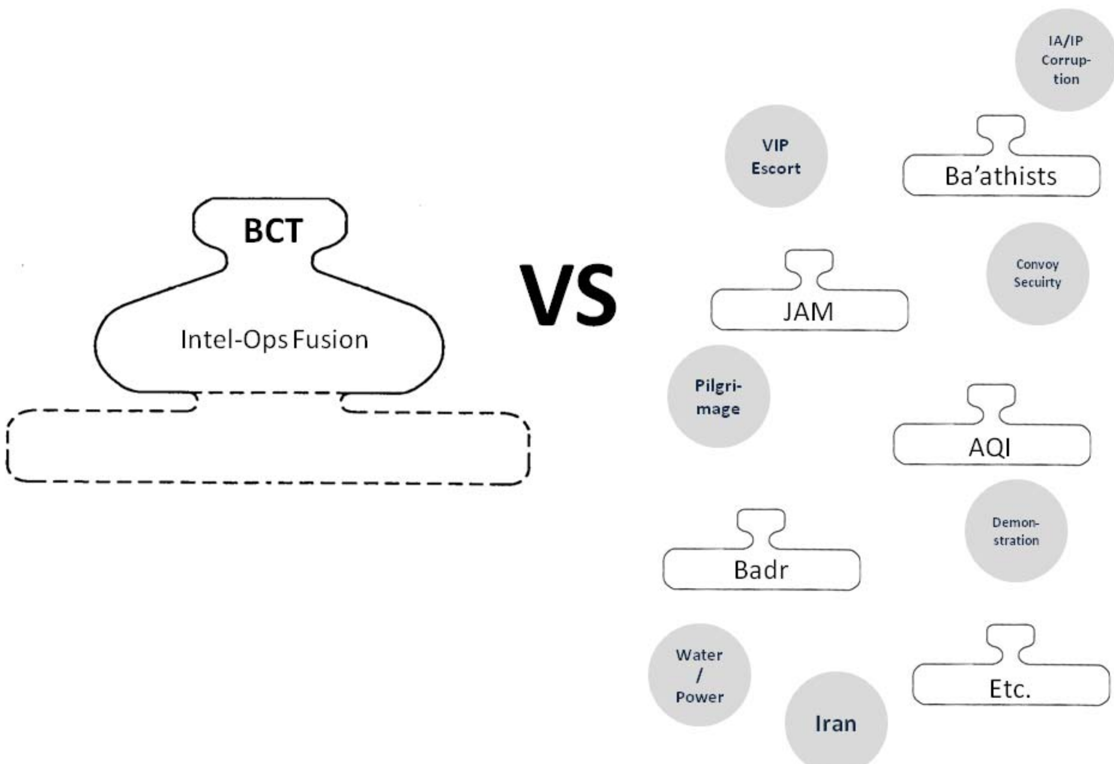

Figure 19. BCT Commander Problem Sets

[130] Odierno, Brooks, and Mastracchio, "ISR Evolution," 55.

Corps C2: The collection management team at the Corps level is responsible for "allocating" and "apportioning" limited numbers of ISR assets/sorties/collection targets.[131] Understanding how to allocate or apportion such assets requires a thorough understanding of the commander's priorities, the developing battlespace, and the needs of subordinate commanders. This is accomplished by the Corps collection management team which is "manned by a mix of highly qualified personnel from all Services," and works to achieve the balance required for meeting higher, adjacent, and lower headquarters requirements. There is a particular emphasis placed on supporting subordinate Divisions and BCTs, providing the recommendations for the allocation of ISR assets, dynamically re-tasking assets as necessary in executing the commander's guidance, and ensuring that ISR assets are being used appropriately and effectively.[132] As the Corps C2 team envisions it, the "ISR problem" is a function of efficiency: using the limited number of available ISR assets to support the greatest number of requirements.

Brigade Combat Team S2: Operations in a counterinsurgency fight often are dependent upon the available ISR support used to locate, identify, and track insurgent operations.[133] Furthermore, these operations tend to be of long duration and tasked against "non-traditional" target sets as COIN is largely population–versus enemy-centric.[134] Instead of looking for an enemy tank battalion, ISR may be tasked with explaining the complex nature of the "human terrain" to include enhancing understanding of cultural issues, perceptions, values, and beliefs of the local population.[135] ISR is therefore often used to provide 24-hour-a-day, seven-days-a-week persistent surveillance to build a pattern of life analysis for a particular neighborhood in a city such as

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[131] The terms "allocating" and "apportioning" are used in a doctrinally incorrect fashion here, however, this is the current terminology used by collection managers currently engaged in the Long War. These terms will be replaced later in this thesis with the words "non-aligned" and "aligned" to indicate assets that are tasked on a mission by mission basis vice those assets that are tasked to support a unit as it sees fit, respectively.

[132] Ibid., 54.

[133] Odierno, Brooks, and Mastracchio, "ISR Evolution," 53.

[134] FM 3–24, para 3–121.

[135] FMI 2–01,1–1.

Baghdad.[136] Therefore, the absence of dedicated ISR assets often prevents a BCT from being able to accomplish its mission. To this end, the BCT S2 team is under considerable stress to acquire the intelligence necessary to execute the mission. In the traditional planning and tasking construct, a BCT submitted a request for ISR support and then waited to find out if the limited number of echelons above division (EAD) assets (those ISR assets controlled by the Corps or the Air Force) would be available to support the mission. At times, the BCT S2 would know that assets were available as much as 72 hours in advance, allowing time to conduct the planning and coordination of the ISR asset into the mission. Unfortunately, even in these ideal situations, the asset was often "pulled" or re-tasked to a high priority mission at the last minute, negating all of the previous planning and leaving the BCT unable to conduct its mission.[137] For the BCT S2, the "ISR problem" is of generating the knowledge necessary to conduct operations over a long duration.

CAOC ISRD: The limited availability of ISR assets can be an insurmountable problem. Weather effects, maintenance problems, and simply limited numbers of assets or crews prevent air component planners from supporting every requirement made by the ground component. Compounding the problem is the fact that a single CAOC ISRD, and in particular its collection management team, was responsible for supporting three distinct theaters of operation. With the exception of the Predator and non-traditional ISR assets, most, if not all, of the air component's ISR assets are required to support all three theaters. This is especially true of the U-2, JSTARS, and Global Hawk and results in scheduling alternating days or weeks in which an asset would be in one theater and then move on to the next. Even for the Predator UAVs, which could not realistically be transferred from one theater or the other, such centralized control is necessary because it allows their satellite downlink frequencies to be transferred among the theaters as

[136] Michael T. Flynn, Rich Juergens, and Thomas L. Cantrell, "Employing ISR SOF Best Practices," *Joint Forces Quarterly* 50 (3) (2008): 58.

[137] Odierno, Brooks, and Mastracchio, "ISR Evolution," 53.

necessary to increase the number of UAVs used in different locales.[138] Therefore, the CAOC ISRD views the "ISR problem" as one of "airmanship," keeping the fleet flying by managing maintenance downtimes, transit times into and out of theater, bed-down locations, sortie rates, communications between ISR assets and their exploitation/analysis support, and ensuring crews were properly rested and scheduled.[139]

Division ISR Ops: The apportionment of EAD assets to the Division level required that Division ISR operations personnel and collection management teams understood the priority of effort within the Division area, the capabilities of the apportioned assets (particularly as compared to the BCT's organic assets) and how best to employ the ISR assets together. Since BCT staffs were typically under-manned or under-trained, they tended to be limited to requesting an "ISR effect" without fully appreciating how to achieve that effect. Instead, Division ISR teams were expected to know which assets were best suited for the requirement and, most importantly, how to integrate the ISR asset into BCT plans. This often required considerable mentoring as it would be up to the BCT S2 to execute the mission based on the plan that was at least partly developed at the Division level. Unfortunately, the typical collection manager at the Division level is a Captain with perhaps one previous tour as a Military Intelligence company commander or an S2 staff officer. While this gives them sufficient experience in working with and coordinating organic Army ISR assets (such as the Shadow UAV), few collection managers have ever worked with USAF assets such as the U-2, Global Hawk, or Predator and are not fully trained on how such assets are requested.[140] The "ISR problem" for the Division ISR Ops personnel is about using and integrating ISR in ways they had not been designed and for which few in the Army had any training.[141]

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[138] Julian C. Cheater, "The War Over Warrior: Unmanned Aerial Vehicles and Adaptive Joint Command and Control," (Master's thesis, School of Advanced Air and Space Studies, June 2008), 48.

[139] Julian C. Cheater, "The War Over Warrior: Unmanned Aerial Vehicles and Adaptive Joint Command and Control," (Master's thesis, School of Advanced Air and Space Studies, June 2008), 21.

[140] Y.A. Kuniyuki, "To Reign the Widening Gyre: Air Force Support to Division ISR Synchronization. Documentation of Lessons Learned from 4th Infantry Division Experiences in Baghdad 2007-2008," Baghdad: 4th Infantry Division, 2.

[141] Ibid., 3.

Air Force ISR units: Despite their geographic distance from the battlefield, Air Force ISR units are eager to contribute to the fight. Unfortunately, this physical separation from those elements that they support often precludes a sufficient understanding of what is required, how their products are being used, and most urgently, how they could improve their tactics or products to support their "customers." These units include the aircrews that plan and execute ISR missions with JSTARS, the RC-135 Rivet Joint (RJ, a signals intelligence aircraft that can intercept and track radar and communications signals), the C-130 Scathe View (which has a full-motion video capability similar to the Predator), and P-3 (a U.S. Navy aircraft with versions equipped with a full-motion video like Predator) (see Figure 20, Left: RC-135V/W Rivet Joint (RJ); Center: C-130 Scathe View; Right: P-3 Orion) as well as the state-side intelligence organizations such as the 480th Intelligence Wing that runs the Distributed Common Ground System (DCGS) constituted with Distributed Ground Stations (DGS) that manage and analyze the video, signals, and imagery provided by the U-2, Global Hawk, and Predator. Based only on the generic taskings they receive from the Air Force CAOC, these units were expected to be on time and to image or collect against a particular location. Such instructions are sufficient for a conventional enemy but in a COIN campaign in which ISR is often used in efforts beyond targeting the enemy, such units require detailed integration with the units they support.[142] The "ISR problem" is less about how to use the asset but rather why they are tasked or how that information will support the ground forces.[143]

[142] *Theater ISR CONOPS*, 19.

[143] Cheater, "The War Over Warrior," 20.

Figure 20. Left: RC-135V/W Rivet Joint (RJ), Center: C-130 Scathe View, Right: P-3 Orion[144]

Air Force JTAC/ALOs: An Air Liaison Officer (ALO) is an aeronautically rated officer aligned with a ground maneuver unit who functions as the primary advisor to the ground commander on the capabilities and limitations of air and space power. The backgrounds of ALOs are significantly varied despite the fact that all are “rated officers.” Though tasked primarily with supporting the integration of CAS with ground operations, ALOs can be navigators, electronic warfare officers, or pilots from aircraft such as the F-15C (an air superiority fighter) that do not have an air-to-ground capability.[145] On the other hand, the Joint Terminal Attack Controller (JTAC) is assigned to the ground component maneuver unit (down to the battalion level) to control aircraft in support of ground forces.[146] JTACs have the authority to direct aircraft delivering ordnance to a specific target cleared by the ground commander.[147] They also provide an essential role in deconflicting aircraft (including ISR platforms) in altitude and lateral separation to prevent mid-air collisions.[148] Due to the fact that the ALO and the JTACs used to be the

[144] After: United States Air Force, “RC-135V/W,” (photograph accompanying RC-135 fact sheet), http://www.af.mil/shared/media/factsheet/rc135.jpg (accessed November 20, 2009), “C-130H Scathe View,” *The Air Force Handbook 2007* (Washington DC: U.S. Air Force, 2007), 94, and Richard J. Brunson, “040707-N-6932B-019,” (photograph), http://www.navy.mil/management/photodb/photos/040707-N-6932B-019.jpg (accessed November 20, 2009).

[145] Joint Publication 2–01, *Joint and National Intelligence Support to Military Operations*, October 7, 2004, III-11.

[146] 705th Training Squadron, “TAGS Review,” (Read ahead study guide for the Command and Control Warrior’s Advanced Course (C2WAC), Hurlburt Field, FL, August 2006, 6).

[147] JP 3–09.3, ix.

[148] Cheater, “The War Over Warrior,” 24.

only Air Force personnel readily available to ground component commanders, they were often asked about Air Force ISR capabilities and tasking. Furthermore, the JTAC was often one of the few members of an Army command element with the capability to speak with airborne assets and was therefore often directed to request support from airborne ISR assets. Unfortunately, the ISR knowledge and training of ALO/JTACs are extremely limited, and they are not part of the tasking process for ISR assets.[149] This caused innumerable conflicts in the re-tasking of ISR assets and a considerable amount of confusion in understanding how such assets operated. For the ALO and JTAC, the "ISR problem" is one of dynamically directing the assets to the most immediate needs of the commander without sufficiently understanding the process for doing such or the true capabilities of the assets they were redirecting.

The Enemy: In any insurgency, the asymmetric advantage possessed by the insurgent is that of information. While the U.S. military has the capability to destroy any targets it can find and identify, the insurgent is able to survive through "concealment and mobility."[150] Thus, ISR is a key enabler in the counterinsurgency fight either through finding and tracking insurgent operations or by supporting those operations that do (for example, providing cuing for HUMINT and SIGINT operations). So long as the enemy is able to exploit the seams in ISR coordination and execution, the U.S. military will remain hard-pressed to eliminate those key nodes that enable insurgent operations and threaten the safety and security of the targeted population. The enemy views the "ISR problem" as being an obstacle to their operations that must be overcome, avoided, or deceived.

Although this list of stakeholders is not exhaustive, it provides sufficient evidence to the number of, often contradictory, goals to be achieved by each. In satisfying the efficiency of the Corps C2, the BCT commander loses flexibility. By maintaining the

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[149] Headquarters Department of the Air Force, "Integration of Airpower in Operational Level Planning Report," *Lessons Learned Report*, (Washington, DC: Headquarters United States Air Force/A9), August 22, 2008, 6.

[150] Odierno, Brooks, and Mastracchio, "ISR Evolution," 55.

"health" of the ISR assets and crews, the CAOC ISRD is preventing the BCT S2 from achieving persistence over the battlefield. All must work together to find the optimal resolution to this problem.

2. Build a Collaborative Environment

Getting the stakeholders to work together, however, is one of the foremost obstacles to be overcome. This requires allowing the stakeholders to interact directly with one another, to develop an understanding for another's perspectives with regards to the wicked problem, and to work together to find an optimal if not perfect solution. Not only must stakeholders have a "shared understanding" of the problem, but they must also have a shared commitment to its solution,[151] which again requires the ability for stakeholders to work directly with one another. Unfortunately, the requirements of executing operations dictate that it is not possible to physically locate all stakeholders in the same geographic location.

Though greatly maligned as "time wasters," meetings are actually the best means by which wicked problems can be resolved.[152] Meetings allow representatives of each of the stakeholders to come together to share their perspective of the problem and their expectations of the solution in such a way that all gain understanding of one another. Only through conversations can shared ownership and commitment be developed,[153] which means that the manner in which the stakeholders are brought together must encourage multi-partner dialogue rather than one-way direction. E-mail is insufficient for such conversations as they are "discrete messages" intended to be efficient and allow more easily for "top down" direction than interacting conversations.[154] Additionally, collaboration and knowledge management should be integrated with "flat" architectures that allow stakeholders access to one another's work. This prevents meetings from

[151] Conklin, "Wicked Problems and Social Complexity," 1.

[152] Conklin, "Age of Design," 15.

[153] Ibid.

[154] Ibid., 19.

becoming summaries of each stakeholder's activities and allows them to become group brainstorming sessions to solve wicked problems.[155] Furthermore, the quality of what could become information overload generally improves as representatives of different stakeholders are able to validate information and resolve discrepancies.[156]

As will be discussed in later chapters, there are a variety of different meetings and technologies that can allow such conversations to occur, but no universal command and control or collaboration construct is the right fit for all situations. The best form of collaboration will develop out of the unique needs of the particular situation.[157] Ideally, the best people should be brought together in one location for face-to-face integration while orchestrating distributed operations support from geographically separated partners. This can have the effect of decentralizing all interested stakeholders and allow them to fuse information in a flattened environment emphasizing horizontal rather than vertical communication.[158] These conversations should lead to an "and" mentality with regards to the problem, recognizing that no one party holds the key to the problem but will require buy-in and support from other stakeholders. Problems are not likely to be solved by choosing a best alternative but by combining multiple alternatives in a fashion that most capably resolves the problem to the satisfaction of the most stakeholders.[159] Without a robust collaborative network, low density assets such as ISR platforms are likely to be used reactively, minimizing their effectiveness.[160]

[155] Guvendiren and Downey, "PIR Development," 3.

[156] Cheater, "The War Over Warrior," 80.

[157] Ibid., 88.

[158] Flynn, Juergens, and Cantrell, "Employing ISR," 60.

[159] Marshall W. Kreuter, et al., "Understanding Wicked Problems: A Key to Advancing Environmental Health Promotion," *Health Education and Behavior* Vol. 31 (4), (August 2004): 446.

[160] Flynn, Juergens, and Cantrell, "Employing ISR," 57.

3. Develop the Ability to Learn and Adjust During Execution

Whatever solution or plan is developed, it must be a living breathing, working product[161] that allows modification to the plan in execution based on updated information. Since problem understanding evolves as solutions are developed and executed, the solution must be malleable even during implementation to ensure that such learning can be applied. Otherwise, CFACC ISR assets are likely to be wasted on targets that are overcome by events (OBE) or turn out to be of little consequence compared to other dynamic targets. Therefore, execution itself must be conducted via an interactive process that allows decision making to occur at the lowest possible level, as close to the action as possible.

F. CONCLUSION

A mindset change is necessary to employ ISR effectively in a COIN campaign. ISR can no longer be viewed solely as the domain of the intelligence community but must represent an extension of the ops-intel fusion paradigm. Though the Air Force has long promoted the notion of "effects" over targets, this philosophy must achieve full-functionality by employing ISR assets in a manner that support BCT commanders and operations and does not simply "service targets." To do so requires the integration of ISR mission planners, intelligence analysts, command and control leadership, and operations personnel through all phases of the ISR mission from planning through tasking to execution as it is dynamically aligned with operational missions and effects.

Reorganizing the CFACC ISR enterprise will help to align the right people with one another at the best echelons for control and execution, but simply putting organizations together is not enough. ISR personnel must understand the importance of constant dialogue to the successful resolution of the wicked problems encountered in COIN campaigns. These constant interactions, at all echelons, will promote a shared understanding of the problems faced and a recognition that because each commander is dealing with different problems, priority of effort cannot simply be based on problem

[161] Downey and Guvendiren, "Collection Management," 13.

sets. A paradigm change is required to address these concerns. Chapter III focuses on the detailed planning necessary for ISR employment and “stakeholders” who must be involved in order to resolve the problems encountered during counterinsurgency execution.

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III. PLANNING ISR—SHARED UNDERSTANDINGS

A. INTRODUCTION

The U.S. Air Force must integrate Intelligence, Surveillance, and Reconnaissance (ISR) planning and execution with joint units to ensure the Combined Forces Air Component Command (CFACC) is represented as a stakeholder in bottom-up planning, to clarify the problems faced by that particular unit, and to allocate the necessary effort to satisfy the needs of the supported commander. It therefore becomes necessary to identify at what level such integration should occur. In the Close Air Support (CAS) realm, the Air Force maintains Tactical Air Control Parties (TACP, including Air Liaison Officers and enlisted Joint Terminal Attack Controllers) down to the battalion level. Additionally, Joint Terminal Attack Controllers (JTACs) often go on patrol with platoon-sized units. Air Force intelligence manning levels and the technological requirements for coordinating ISR currently prohibits assigning personnel permanently to the battalion level or lower.[162]

Rather than create permanent task force structures that support specific echelons, however, the Air Force should instead focus on assigning personnel and coordinating planning at the most appropriate level given the circumstances. Instead of attaching to a specific force, the Air Force must develop the flexibility to integrate as necessary regardless of the organization. While the U.S. military has a long history of joint integration, it may be necessary in some events to integrate ISR planning and execution with inter-agency task forces as well, many of which lack the formal structures of the U.S. military. As an example, during the recovery efforts of Hurricane Katrina in 2005, U.S. Air Force intelligence personnel coordinated with local, state and federal law enforcement, recovery, and service organizations in an effort to provide the ISR support

[162] Michael Grunwald, Jr., "Transforming Air Force ISR for the Long War and Beyond," (Master's thesis, Air Command and Staff College, April 2008), 12.

that was required by all.[163] These efforts, very much in the embryonic stages, represented the first employment of ISR liaison officers, to be discussed later in this chapter.

In the case of Iraq by 2007, the U.S. Army established the Brigade Combat Team (BCT) as the lead organization. The BCT becomes the appropriate level of focus for Air Force integration for two reasons. First, by designating the BCT Commander the "land owner," the Combined Forces Land Component Commander (CFLCC) identified the BCT Commander as the "decision maker" for his area of operations. The Division and Corps commanders provided oversight, but their primary focus was to enable the BCT Commanders to be able to execute the plans and enact the decisions made at the BCT level. Second, by making the majority of Army ISR assets organic to the BCT level (to include human and signals intelligence teams and unmanned aerial vehicle platoons), the Army provided the necessary enabling technologies to the BCT to execute the BCT Commander's operations. All other enabling efforts were then delegated by higher headquarters to the BCTs as required. When identifying the appropriate agencies or echelon for integrating Air Force efforts, CFACC leaders should identify the location of the designated "decision-maker" who possesses the most organic capabilities for executing their decisions. In 2007, the CFLCC focused planning and execution of counterinsurgency operations at the BCT and therefore made the BCT the appropriate level to which U.S. Air Force planners and liaisons should be focused. In other theaters or as the campaign develops, it may be necessary to shift integration higher or lower.

For example, after the summer of 2009, the United States handed responsibility for security operations in Iraq to the Iraqi Security Forces (ISF) and sequestered U.S. combat forces on their Forward Operating Bases (FOBs). Unfortunately, despite the placement of ISRLOs as low as the BCT level, planning was now being conducted by the Iraqis with the resulting plans and requests for ISR being forwarded to U.S. forces, after the fact. Once more, despite the improvements to the ISR process made with regard to

[163] Kevin L. Buddelmeyer, "Military First Response: Lessons Learned from Hurricane Katrina," (Master's thesis, Air Command and Staff College, April 2007), 26–27.

U.S. forces, the Corps CM team and the CAOC were forced to react to the Iraqi plans, relying extensively on ad hoc missions.[164] Just as had been the case prior to 2007, the Joint planning process had been de-synchronized because liaisons were not appropriately integrated with the actual mission planners. The CFACC must not focus on integrating with the Army but on being prepared to integrate as necessary where appropriate. For ease of explaining the processes and to eliminate a need to educate on foreign organizational structures, this chapter focuses on the BCT as it was employed in Iraq 2005–2008 as the defining model for CFACC ISR integration.

B. EFFECTS WORKING GROUP

To enable intelligence and operations personnel to more closely work together, commanders at all echelons have begun developing various forms of "fusion cells."[165] Some variants were focused primarily on real time integration of intelligence and operations assets, optimized for High Value Individual (HVI) targeting. Others were designed to conduct the necessary long term planning and coordination to facilitate the broader counterinsurgency strategy. One example of such a coordinating body within the BCT is the Effects Working Group (EWG), which brings together the chiefs of each Line of Effort (LOE, the various efforts that work within the civil, political, security, judicial and other sectors of the community in order to meet the BCT commander's mission objectives of building a secure, self-sustaining local community that is free of insurgency).[166] At this level, the network is self-organizing as LOE chiefs or other members of the BCT join the EWG as necessary to coordinate support for their operations to include acquiring the information they need (via ISR) to accomplish their goals. Although the primary LOE chiefs are likely to be permanent members of the network, along with the BCT intelligence officer (S2), the collection manager, and the BCT Operations officer (S3) to represent the commander and guide/steer the EWG to

[164] Former MND-C ISRLO, e-mail message to author, September 11, 2009.

[165] Joint Publication 3–24, *Counterinsurgency Operations,* October 5, 2009, V-2.

[166] Guvendiren and Downey, "PIR Development," 4-5.

accomplishing the BCT Commander's objectives,[167] other members of the BCT may join or leave the group as necessary depending on their own needs or contributions. The EWG itself serves as the core group of knowledge management, providing an environment in which members can contribute, share, and explore ideas and reinforces continuous innovation.[168]

It is at the EWG that the ISR problem is first identified, focused specifically (and almost exclusively) on what information is required. It may not be possible at this point to determine *how* to collect the information. To help formulate this question, and in particular to put it into a language that can be translated into specific ISR effects and tasks[169] against which ISR missions can be assigned, requires an individual familiar with CFACC capabilities and limitations. Although the Army collection manager is often able to make such translations with regards to organic ISR capabilities (such as human intelligence teams or signals intelligence units), they often lack the experience or training necessary to understand the full capabilities and requirements of CFACC ISR assets.[170] For this reason, the CFACC must be sufficiently represented at this level.

Since the Army no longer directs actions from the Corps level down (as was the case in conventional planning and operations), the CFACC needs a means to coordinate planning from the bottom-up. This will require placing CFACC planners at the BCT level to include ISR Liaison Officers (ISRLOs) who must maintain the CFACC's vision of ISR employment while also managing the interaction of CFACC ISR asset employment with BCT operations.[171] Additionally, while these ISRLOs act as the hub joining CFACC ISR agencies and asset liaisons to the planning and operations nodes of the Army BCT,[172] they are not able to fully integrate the planning of BCT operations

167 Patti Anklam, *Network: A Practical Guide to Creating and Sustaining Networks at Work and in the World,* (Boston: Butterworth-Heinemann, 2007), 59.

168 Anklam, *Network*, 6.

169 *Theater ISR CONOPS*, 7.

170 Kuniyuki, "To Reign the Widening Gyre," 2.

171 Anklam, *Network*, 108.

172 Ibid., 57.

with CFACC ISR operations. For this reason, the Air Force Distributed Common Ground Station (DCGS) enterprise, which provides the control, processing and exploitation for the majority of CFACC ISR (to include the U-2, Global Hawk, and Predator), redesigned internally to create Distributed Ground Station (DGS) Analysis and Reporting Teams (DARTs) aligned with specific Land Component Command Divisions in theater. This alignment of DARTs with each Division promoted habitual relationships which in turn created familiarity and through shared experiences, dealing with shared problems and celebrated shared successes, created trust.[173] By placing the ISRLO at the BCT level (they currently operate primarily at the Division level) and by integrating the DART into the EWG's planning process, the CFACC can now begin planning ISR missions in parallel with, rather than sequentially to, the BCT process. Furthermore, such direct interaction will encourage transparency in the planning and tasking process and give each component direct insight into the decision-making process of the other.[174]

C. ISR PLANNERS: BUILDING THE ADHOCRACY

1. Improving Horizontal Linkages

The EWG provides a collaborative environment that emphasizes "flat knowledge management architecture" to merge staff efforts into a single process that shares rather than "stove-pipes" information.[175] The EWG is, in fact, more than just a daily meeting of key personnel. It is a concept in which all members of the BCT have access to each element's information, plans, and objectives.[176] Such a format promotes ongoing collaboration and integrated planning, reserving the daily EWG meeting as a forum for finalizing plans and prioritizing resources.

The introduction of the ISRLO and DART into this group, along with the Air Liaison Officer, will provide this same horizontal linkage or "flat structure" to the joint

[173] Anklam, *Network,* 152.

[174] Ibid., 97.

[175] Guvendiren and Downey, "PIR Development," 3.

[176] Ibid.

effort beyond the boundaries of the BCT itself. Such representation of the CFACC and ISR enterprise will improve coordination among all partners, enhance understanding of COIN problems, and promote trust and commitment to a shared solution to be enacted by all elements through close integration.

2. Command and Staff Responsibilities

Mintzberg points out that an adhocracy, like a professional bureaucracy, "relies on trained and specialized experts to get the bulk of the work done." Furthermore, the adhocracy relies on liaison devices (such as ISR liaison officers) to integrate various managers and task forces. Unlike a professional bureaucracy where the experts tend to work in the operating core and therefore hold the power, an adhocracy tends to be more dispersed with experts/liaisons operating where the decisions need to be made.[177] In the U.S. Army Brigade Combat Team, the Effects Working Group fills the role of the adhocracy as a formal part of a machine bureaucracy. Members of the EWG will come together to develop plans, to coordinate actions, and to share resources and then will reform in part or whole as necessary at various locations and times to oversee execution of a myriad of different counterinsurgency (COIN) efforts.

The Effects Working Group will require representation of many different elements within the BCT as well as from those external agencies that will be providing support to the BCT operations. Despite the various organizational loyalties of these group members and their varied specialties, the detailed integration required for joint operations and particularly those requiring ISR support demand that these stakeholders work together as a unified team.[178] The key attribute of the EWG is that horizontal linkages are emphasized over vertical hierarchies. Rather than request support from higher headquarters, await a response, and then begin planning, integration within the EWG is the starting point as different capabilities are explored and developed. From there, a coherent plan is forwarded to asset managers to ensure that capabilities can be

[177] Mintzberg, "Organization Design: Fashion or Fit," 112.

[178] JP 3–09.3, III-11.

made ready when needed. Although not every asset will be available and some requests will have to be denied in order to support higher taskings, the planning and integration that is conducted at the EWG will allow for a broader range of options that in turn will allow for the smoother integration of other, less desirable assets to be substituted into the plan. Having planners conducting face-to-face, even if only virtually, meetings allows all stakeholders to appreciate the problem to be resolved and the varied perspectives of the different stakeholders involved. The following list of stakeholders that should be involved in the EWG is based upon the typical mission planning cell as identified in Joint Publication 3–09.3[179] and should be tailored as necessary for the given area of operations (AO).

a. Supported Commander

The BCT commander is the landowner and therefore the individual responsible for defeating the insurgency within his AO. The BCT commander establishes the objective of all BCT operations and defines the rules of engagement that will promote successful accomplishment of the mission with regards to supporting the local population. The BCT commander is represented at the EWG by the S3 Operations Officer who ensures that the EWG remains focused on the BCT mission and objectives. The S3 must not exert any undue influence in the name of the BCT commander in order to allow the EWG to conduct planning as necessary to ensure that the best possible solutions are developed in response to the complications of the counterinsurgency campaign. The S3 is responsible for ensuring joint ISR is fully integrated into operations orders (OPORDs) and the collection management plan.[180]

b. Intelligence Staff

The S2 shop is typically represented by three distinct elements. The first is the S2 who brings the enemy's perspective to planning, focused on the enemy's capabilities, doctrine, and limitations. In this fashion, the S2 helps to promote an

[179] JP 3–09.3, III-11.

[180] Ibid.

understanding of how the enemy is likely to respond to the various plans, allowing BCT planners to think several "moves" into the future in order to minimize unintended consequences and to develop follow-on or alternative plans based on enemy reactions. The S2 plays the "devil's advocate," highlighting flaws or vulnerabilities in the plan. As necessary, the S2 also provides targeting information for kinetic or non-kinetic operations.[181]

The S2 ISR Operations personnel are the soldiers who will feed real time battlefield intelligence to the BCT Tactical Operations Center and relay that information to subordinate units.[182] Although the S2 ISR Ops team will be supported by the Air Force ISR Liaison Team (to be discussed in detail in Chapter V), the S2 ISR Ops team is the most familiar with Army doctrine and tactics and will be key in ensuring that available intelligence is disseminated to the appropriate decision makers. Most importantly, the S2 ISR Ops team will be responsible for integrating all organic ISR capabilities to include full-motion video assets (including both BCT level unmanned aerial vehicles and fixed cameras), human intelligence (HUMINT) teams, and signals intelligence (SIGINT) assets.

Finally, the S2 Collection Manager will be essential in formalizing the requirements of the EWG for higher headquarters tasking. Unfortunately, in most BCTs, the collection manager (CM) is not an official position,[183] which requires that the CM simply be an additional duty for another member of the S2 staff. In many cases, the CM is actually the senior ISR Operations soldier and, because of ISR Ops requirements and lack of formal CM training, is capable of little more than simply submitting requests for UAVs.[184] While much of collection management is focused on maximizing the

[181] JP 3–09.3, III-11.

[182] JP 3–09.3, III-11.

[183] Downey and Guvendiren, "Collection Management," 2.

[184] Ibid.

effectiveness of a limited number of ISR assets, at the BCT level, the CM is primarily focused on converting intelligence requirements into collection requirements.[185]

c. LOE Operations Officers

The Line of Effort (LOE) Operations officers are the lead members of the EWG. Although the S3 keeps the meeting on track and all LOEs focused on the BCT Commander's strategy, the LOE Chiefs are the ones with the "mini-campaign plans" that working together achieve the BCT Commander's vision for a sustainable local community. The EWG serves to ensure that each LOE plan supports the others and none of them become counter-productive for the operation as a whole.[186] Each LOE Chief will have established "lanes" that define their responsibilities regarding planning, execution, and evaluation of specific efforts. LOEs will vary by BCT AO but common ones may include Security, Governance, Essential Services (to include infrastructure and medical services), Economics, and Information Operations (which deals with Psychological Operations and Public Affairs). The LOE Chiefs will not only direct the BCT operations but will be the direct liaisons with their indigenous counterparts such as the Chief of Police, the local government (to include tribal councils), local contractors, and the chamber of commerce.[187]

d. Fire Support Coordinator (FSCOORD)

Although the majority of operations in a COIN campaign will be non-kinetic, with an emphasis on improving the lives of the local population and protecting them from the insurgents, the employment of kinetic effects (close air support, artillery, and direct fire weapons) is an unavoidable reality of combat. Such effects must be carefully weighed against the requirements of the COIN effort by the BCT to ensure that the use of "fires" enhances security without detracting from the safety of the population

[185] Joint Publication 2–01, *Joint and National Intelligence Support to Military Operations*, October 7, 2004, III-11.

[186] Guvendiren and Downey, "PIR Development," 4.

[187] Ibid., 5-6.

or jeopardizing non-kinetic efforts. Furthermore, such effects can be sufficiently orchestrated to enhance other COIN efforts by providing a “show of force” to reassure the local populace of the BCT’s presence, to intimidate insurgent forces, and to create effects that can be monitored by ISR (such as targeting a known abandoned building with the intent of getting nearby insurgents to react either through counter fire or by communicating via radios or telephones that can then be monitored). Any employment of kinetic fires must also be carefully deconflicted with the presence of airborne assets to include attack aviation, close air support, and ISR assets.

The FSCOORD is responsible for interlacing kinetic and non-kinetic effects to promote better understanding of second and third order effects. The FSCOORD also provides the prioritization for subordinate battalions and their operations, using available intelligence, assigned assets, and an understanding of the operational momentum of each of the battalions to determine where BCT efforts should be focused.[188]

e. Air Liaison Officer (ALO)

The ALO advises the BCT commander and his staff regarding the capabilities and limitations of CAS and other air support platforms. This requires a detailed knowledge of the allocation of air assets as provided by higher headquarters, most notably the Air Support Operations Center (ASOC), and the Division’s plan for sortie distribution. The ALO is responsible for the specific planning of CAS missions and the development of the CAS requests and planning documentation.[189] With regards to ISR planning, the ALO will be essential in identifying those close air support assets that might be able to provide a non-traditional ISR (NTISR) capability to include the use of fighter aircraft targeting pods to fill an absence of full-motion video capabilities.

[188] Christopher W. Wendland, “BCT FSCOORD in OIF: Targeting by LOOs,” Field *Artillery,* March-April 2007, 43–44.

[189] JP 3–09.3, III-12.

f. Electronic Warfare Officer (EWO)

The increased use of the electromagnetic spectrum to attack and protect coalition forces has necessitated the need for experienced electronic warfare officers in the BCT to advise on the employment of the BCT's organic electronic counter-measures and to request additional electronic warfare assets to support BCT operations. Such EW systems may be used to jam the frequencies used to detonate IEDs or to scramble the communications of insurgent forces. The EWO must make careful considerations of how such systems will impact friendly communications or operations, as well. Jamming various frequencies can degrade friendly communications, could set off explosive devices when explosive ordnance team members are approaching the device to disarm it, or could negate the intelligence value of signals intelligence intercept capabilities by jamming the same signal ISR is attempting to track. The BCT EWOs (from the Air Force, Navy, and increasingly from the Army) provide the expertise to maintain BCT organic equipment and to develop comprehensive strategies for employing a wide-array of organic and higher headquarter assigned EW assets to defeat adversary threats.[190]

g. ISR Liaison Officer (ISRLO)

As the newest member of the joint team, the ISRLO is still a developing position with shifting responsibilities from one unit to the next. In order to improve Combined Forces Air Component Command (CFACC) Intelligence, Surveillance, and Reconnaissance (ISR) support to a Counter Insurgency (COIN) campaign, the CFACC will need to rely upon a select group of highly talented liaison officers to "resolve" the wicked problems of balancing competing needs of the CFLCC and the CFACC. Specifically, this liaison officer will need to be able to act as an honest broker for the various land component personalities who require rapid and flexible support while simultaneously acting on behalf of the CFACC's need to manage the health of the assets and personnel tasked with providing that support. Traditionally, the CFACC has relied

[190] Evan Loyd, "Electronic Warfare Officers Keep Soldiers Safe," *American Forces Press Services,* November, 21 2008, http://www.defenselink.mil/news/newsarticle.aspx?id=52041, (accessed July 31, 2009).

upon the Air Liaison Officer to coordinate the air support needs of the CFLCC, providing advice on air component capabilities and planning expertise for the close integration of air and land operations.

The ALO, however, is limited primarily to the employment of kinetic effects (Close Air Support) or mobility operations. To date, ALOs have received very little training with regards to ISR operations to the severe detriment of CFACC support to COIN. Most sources indicate that ISR is one of the essential, if not the primary, capabilities provided by the CFACC in a COIN campaign. Therefore, the absence of such advisory or planning capability in the Army limited the ability of the CFACC to fully support such operations. One of the first initiatives launched by the Air Force to improve coordination with the U.S. Army was the introduction of the ISRLOs.

Beginning in the winter of 2006, the CFACC began to assign ISRLOs to each division in Iraq, followed by additional ISRLOs assigned in Afghanistan. One ISRLO was assigned to each Division.[191] The requirement for experts who could operate in such a fluid environment, moving throughout the organization as necessary to help make decisions created a tremendous obstacle for the Air Force in identifying the right individuals for such a tasking. From the beginning, it was understood that while initial ISRLOs would be hand-picked based on recommendations of other ISRLOs and the leadership of the ISR Division (ISRD) of the CAOC, future ISRLOs would need to be properly trained to accomplish the task and could conceivably be pulled from any number of ISR units to accomplish the mission. The task of identifying the required skill sets and appropriate personality types for the job was largely based upon the initial cadre of individually selected ISRLOs. Since these pioneers were highly praised by their supported commanders and had achieved significant gains in ISR effectiveness, they seemed to be the ideal models upon which to choose their successors.

(1) Tasks. Captain Mathew Castillo, the ISRLO for Multi-National Division-Baghdad, described the role of the ISRLO in a manner that would be

[191] Grunwald, “Transforming Air Force ISR,” 10.

considered high in variety based on “a large number of unexpected situations, with frequent problems.”[192] As Castillo and other ISRLOs discovered, their job consisted of three distinct elements: training, planning, and assessment.[193] Many ISRLOs have added a fourth task in the form of “coordination,” to be discussed in greater deal in Chapter V.

Due to the rapidly advancing nature of ISR sensors and capabilities, it is difficult for those who are not regularly involved with ISR assets to understand their full-range of options. For U.S. Army soldiers who may know their own assets well, the Air Force assets are often misunderstood or under-utilized. The ISRLOs typically have at least one ISR assignment in their career history and many maintain regular contacts within the Air Force ISR community. This allows them to stay current on ISR capabilities and to become familiarized with the latest tactics, techniques, and procedures employed by the Air Force ISR community. The ISRLOs then travel throughout their assigned battlespace educating soldiers and U.S. Air Force ALOs and JTACs about the available capabilities from both traditional and “non-traditional ISR” assets.[194]

An ISRLO also works with the U.S. Army collection management soldiers to ensure that ISR assets are optimally employed. By reviewing collection requests submitted by subordinate BCTs and comparing them to the commanding general’s priorities, the ISRLO is able to apply his/her extensive ISR background and training to ensuring that the right asset is requested and advises how best to employ it.[195]

One of the most frequent Air Force complaints has been the lack of feedback from the Army. Without knowing if or how their missions supported the Army, AF ISR units are unable to improve or at least replicate the techniques that worked. Often, these units will produce mission reports that claim to be successful, having met the

[192] Daft, *Essentials of Organization Theory and Design*, 133.

[193] Michael Hoffman, “Airmen Imbed with Ground Units to Get Them ISR,” *Air Force Times*, October 20, 2008, 27.

[194] Hoffman, “Airmen Imbed with Ground Units,” 27.

[195] Ibid.

initial criteria provided by the Army, only to find out later and through unofficial channels that the Army has been unsatisfied with the missions. The ISRLOs provide a link between the ground units they are supporting and the AF ISR units that provide the support to identify lessons learned,[196] correct misperceptions about what occurred on the mission, and even to a large extent, translate Army jargon into something the Air Force ISR specialists can understand.

(2) Training and Selection. ISR planners must be experts not only on the various systems employed by the CFACC but must also have a solid foundation in military doctrine and theory so that they are able to fully integrate ISR operations into the overall campaign. Tactical expertise gained during operations in ISR units must be further cultivated through participation in major exercises, which in turn must be designed to accurately reflect the intelligence focused nature of modern warfare.[197] While understanding a single asset's capabilities and limitations is important for liaisons operating throughout the collection management architecture, it is the ISRLOs ability to integrate, layer, and synergize multiple ISR and NTISR assets that will bring success.

Stateside training, prior to deployment into theater, was refined to provide some semblance of standardization. ISRLOs graduated from the U.S. Air Force ISR Operators Course (IROC) and then visited various ISR units to be familiarized with how those agencies did business as well as to develop invaluable personal relationships with the ISR mission commanders with whom they would be in coordination. Additionally, ISRLOs began to attend training exercises with the Army units they would be supporting allowing them to begin developing organizational links and "face time" with the commanders.[198] However, what could not be provided in training was the ISRLO's need for great powers of persuasion, the stamina to see projects through to completion, and integrity of purpose[199] in order to overcome the parochial biases of the

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[196] Hoffman, "Airmen Imbed with Ground Units," 27.

[197] *Theater ISR CONOPS*, 31.

[198] Kuniyuki, "To Reign the Widening Gyre," 4

[199] David Bornstein, *How to Change the World: Social Entrepreneurs and the Power of New Ideas,* Oxford: Oxford University Press, 2007, 94.

organizations to which the ISRLO is assigned and to provide effective coordination of air and land effects. These traits would simply have to be found among the possible candidates.

Complicating the training of ISRLOs was the inability to effectively analyze their required skills sets. As Daft explains, "when the conversion process is analyzable, the work can be reduced to mechanical steps and participants can follow an objective, computational procedure to solve problems."[200] Unfortunately, the ISRLO tasks were not so easily broken down into mechanical steps. The difference is one between being able to look up the solution to a problem (such as a checklist to be followed in a specified emergency) and having to develop a solution for a problem not previously encountered. This, of course, requires not only a "subject matter's expertise" level of understanding on the systems and capabilities available but also developed problem solving skills. Given the diverse nature of the problems to be encountered in the COIN environment and that none of the Air Force's ISR assets had specific tactics, techniques or procedures (TTPs) for such problems, the ISRLOs were expected to invent solutions to COIN problems. This tended to require individuals with excellent problem solving skills regardless of their level of ISR expertise. In fact, many of the ISRLOs had only limited ISR experience, but because they knew who to contact and when, they were able to develop effective solutions to the COIN dynamic.

(3) Speaking the Same Language. Effective coordination of CFACC ISR with CFLCC ground operations required the ability to "speak the same language." Unfortunately, the absence of joint training for ISR personnel and only recently developed COIN doctrine in all services greatly impacted the ability to share stakeholder understandings of the problem and to develop coherent plans to which all could commit. The ISRLOs helped to initially overcome these problems as representatives of the CFACC embedded with U.S. Army and Marine Corps units. Having trained and operated within Air Force units, ISRLOs could bring those experiences and service perspectives to their supported units where they gained first hand

[200] Daft, *Organization Theory and Design*, *133*.

observations about the needs and requirements of the ISR "customers." To be effective brokers for both components demanded that the ISRLOs immersed themselves in the organizational culture of their supported units.

Organizational culture "is the set of values, guiding beliefs, understandings, and ways of thinking that is shared by members of an organization and is taught to new members as correct." These shared values and beliefs provide "members with a sense of organizational identity and generates a commitment to beliefs and values that are larger than themselves." Observing the "iceberg model" of organizational culture, one can see that there are two levels to culture: that which is visible and the underlying level. The visible level includes uniforms, symbols, observable ceremonies or traditions but also includes such things as slogans, stories, and organizational specific jargon.[201] (See Figure 21, Iceberg Model of Organizational Culture.) For the ISRLO, the most notable indication that they had become part of the Army culture was the fact that initially, they were authorized to wear the Army Combat Uniform (ACU) complete with right shoulder "combat" patches for having served with the unit for six months deployed. The ISRLOs adopted Army phrases and acronyms and participated in various Army ceremonies. The deeper level of organization culture includes the "underlying values, assumptions, beliefs, attitudes, and feelings" that are the "true culture" of the organization.[202] There was considerable concern (sometimes openly acknowledged) that the ISRLOs were "going native" and "drinking the green kool-aid," suggesting that they were no longer "honest brokers" of AF ISR support but had in fact adopted the Army attitude of taking as much ISR as they could manage whether they needed the support or not.

[201] Daft, *Essentials of Organization Theory and Design,* 368–369.

[202] Ibid.,, 369.

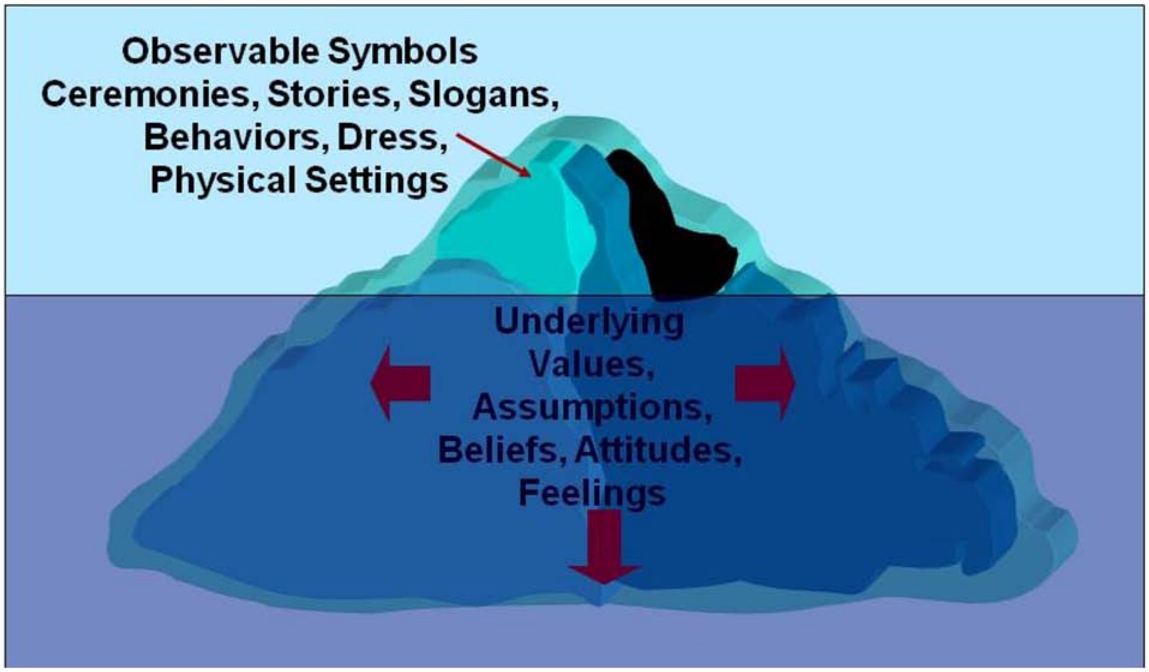

Figure 21. Iceberg Model of Organizational Culture[203]

This culture was not limited to just the influence of the Army. In fact, the driving force behind the initial ISRLO efforts was the direction by the CFACC A2 (chief of intelligence) to, "Make it like CAS." To this end, the ISRLOs developed a number of procedures to distance ISR support from the traditional collection management regime and force it to be more adaptable along the lines of the CAS infrastructure. This effort continues to be an explanation for the ISRLO concept despite its many detractors. As explained in the *Air Force Times*, the intent of the ISRLO program is to provide ground commanders the same level of support and integration they can expect from Close Air Support. The ISRLOs work to request and coordinate ISR assets, both manned and unmanned, in the same fashion that a JTAC plans and coordinates air strikes in support of Army operations.[204]

[203] From: Daft, *Essentials of Organization Theory and Design*, (Cincinnati, OH: South-Western, 1998).

[204] Hoffman, 27.

On the CFACC side, the ISRLOs developed a habitual relationship with many of the supporting ISR organizations. This was a purely informal arrangement initially and ran counter to Air Force doctrine and structure. Per doctrine, the "subject matter experts" reside at the CAOC in the form of the intelligence discipline specific collection managers in the ISRD and the platform liaison officers resident in the Intelligence, Surveillance, And Reconnaissance Cell (ISARC) of the CAOC Combat Operations Division. Many of the collection managers, however, were in their first ISR assignment having previously worked with fighter or bomber units. Similarly, though the platform liaison officers were from the ISR organization they represented, their experience levels, work ethics, and general attitudes were sufficiently diverse to negate any assumption of a common level of expertise. By working directly with the air/mission crews that were executing the ISR operations, the ISRLOs were able to tap into the true expertise and found willing partners who understood that the more they knew of the unit they were supporting, the easier it would be for them to execute their mission. This coordination was made even easier by the reorganization of the DCGS community into regional and even Divisionally aligned units.

h. DARTs and Regional Divisionalization

A stable environment is one that remains the same over a period of months or years.[205] Not only was this not the case in Iraq with regards to the changing nature of the insurgency, but instability in the Air Force ISR structure was worsened through a number of policy decisions. The most important of these was the limited deployment of most Air Force personnel. While the Army attempted to stabilize deployment schedules (and to increase the opportunity for units to have a greater impact on their area of operations) by increasing deployment lengths to 15 months, the Air Force continued to rotate personnel on a three- to six-month cycle. This significantly limited the ability of AF personnel to become familiar with their operating environment.

[205] Daft, *Essentials of Organization Theory and Design,* 88.

Additionally, while each Army unit was responsible for a specific geographic region in which they could become experts, the Air Force, initially, made no effort to replicate this assignment of focus. Instead, geographic assignment for assets (and their supporting crews) could change from one day to the next. Although to some degree a symptom of the limited number of assets available, the greater impact was on the analytic crews who were treated as interchangeable assets. Even with regards to assets such as the Predator, which due to its limited range were confined to the same regional areas, the analytical crews who monitored the video feed from the United States were often switched between Predator missions. The same was true for imagery analysts as well, limiting their understanding of the battlespace they were supporting and what might appear in the images as "normal" or "unusual" activity.

The Air Force DCGS community, which includes the geographically dispersed mission elements of the different DGS, developed an effective remedy for this problem. Initially, missions were assigned to DGS crews based on workload estimates. Using this construct, an imagery analyst might spend four hours of his shift monitoring video feed from Afghanistan and then the next four hours watching a feed from Iraq. This division of attention would alternate night after night, so that there was no continuity of operation and little opportunity to gain familiarity with the supported unit or the battlespace in which the feeds were originating. An example of this would be a DGS imagery analyst observing fires on a video feed and reporting this as unusual activity. The sensor operator for the Predator involved (being limited geographically to the same battlespace) contradicts this report, explaining that such activity is normal for the region.[206] (See Figure 22, Air Force Distributed Common Ground Station Architecture.)

[206] DGS crew, e-mail message to author, 2007.

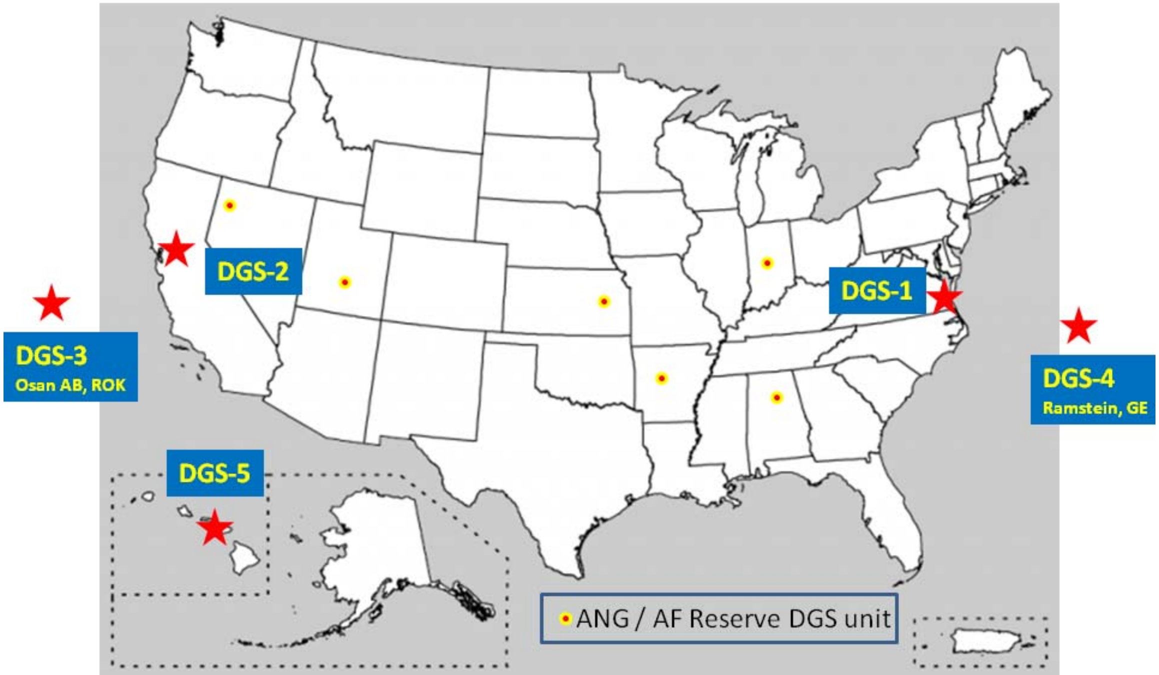

Figure 22. Air Force Distributed Common Ground Station Architecture

This problem was replicated in other platforms as well. Army collection managers were often frustrated by the fact that they would submit feedback on a mission only to have the exact same problems on the following mission because the crew they critiqued on the first mission was not involved in the next. One U.S. Army collection manager explained that he took the time to identify 200 potholes in a road that had been filled by the Army and directed the Air Force imagery analysts not to identify these as potential improved explosive device (IED) emplacement areas. The first mission to occur after this guidance was given did exactly as told, ignoring the potholes and only identifying other suspicious locations. The very next mission after that, however, identified over 200 targets, most of them being the potholes that had been previously identified. This had a significant impact on the trust relationship between the Army and the Air Force and soon the Army stopped providing any feedback at all. From their point

of view, and quite correctly, they could see no point in providing feedback to a crew who would be unable to benefit from it on the next mission.[207]

Intelligence and operations must be carefully integrated, particularly during COIN operations, and this demands that collection units be linked directly to the supported analysts and operators.[208] In March 2007, the Air Force response was to geographically designate DGS-1, located at Langley AFB, VA, as being focused on Iraq and DGS-2, at Beale AFB, CA, as being focused on Afghanistan. Furthermore, each DGS also created a DART designed to focus on those specific geographic areas and to work directly with the ISRLOs and the collection managers from those areas.[209] Though specific organization varied, the DARTs further divided their teams into Division specific elements so that the same all-source analysts were responsible for working with the same Division and ISRLO on a regular basis. These habitual relationships significantly improved the feedback process, ensured area familiarity for Air Force crews that were geographically separated from their areas of operation, and improved overall mission results.[210] (See Figure 23, AF DCGS Re-organization for Regional Orientation).

[207] MND-N collection manager, e-mail message to author, 2007.

[208] Joint Publication 3–24, *Counterinsurgency Operations, October 5, 2009*, V-2.

[209] Dan King, "DGS Analysis and Reporting Teams (DART) 'Intelligence Fusion," (bullet background paper for ACC/A2YD, Langley AFB, VA, July 20, 2007).

[210] Ibid.

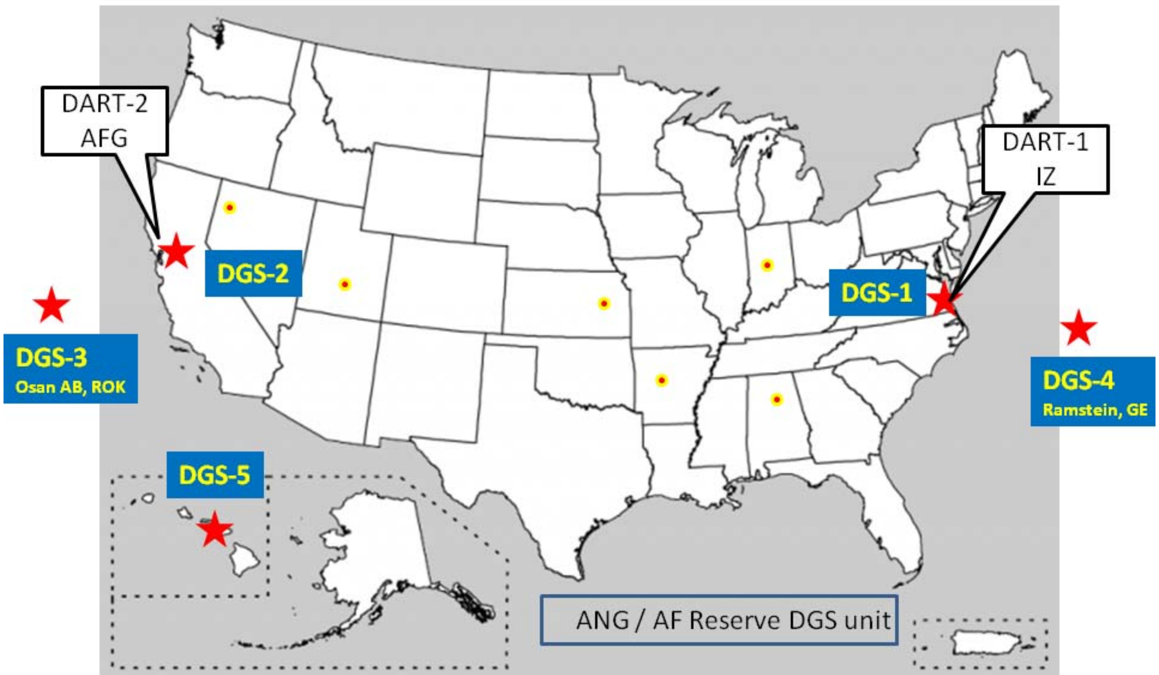

Figure 23. AF DCGS Re-organization for Regional Orientation

i. Creating Synergistic Effects

These efforts by the U.S. Air Force, the deployment of ISRLOs and the creation of regionally oriented/division-aligned DARTS, provide the foundation for Air Force participation/representation in any ad hoc structure. These capabilities will allow the Air Force to move seamlessly from an efficient machine bureaucracy structure to a highly integrated and flexible adhocracy capable of dealing with dynamic, short-term problems within an instable environment.[211] Physically locating ISRLOs in the BCT planning room and tactical operations center (TOC) and tying the DART virtually to the supported ground units, helps to overcome the difficulties of lack of communication, ensuring that all stakeholders are aware of the problem to be addressed, the agreed-upon solution, and the development of that solution in execution.[212]

[211] Waterman, *Adhocracy,* 26.

[212] Ibid., 20.

(1) Building a JOINT Team. Physical presence cannot be over valued. Though less effective, virtual coordination can be significantly improved upon through consistent relationships and shared successes. In this fashion, having ISRLOs forward deployed and ground liaison officers (GLOs) representing the CFLCC in the various DCGS locations, permits planning and execution to occur jointly. The EWG serves as the focal point for bringing together kinetic and non-kinetic planners with Army (or Marine Corps) and Air Force planners in the form of ALOs, JTACs, ISRLOs, and DARTs. This infusion of Joint expertise increases the potential for problem solving success by linking together adaptive stakeholders into an organic flux for overcoming problems for which no one person or agency has a depth of knowledge or relevant experience.[213]

(2) Overcoming geography. Improvements in virtual technology, to include video teleconference, voice over secure internet protocol (VOSIP), and remote computer operations, allow interface between geographically separated units to occur naturally. Increasingly, technology is allowing personnel from reach back organizations to observe, in real time, the data feeds, computer desktops, and TOC operations of their supported units. By remotely linking computer systems, it is possible for Army ISR Operations soldiers in Baghdad to observe the feeds and imagery being analyzed by Air Force personnel located at a State-side DGS. Similarly, by using video cameras and VOSIP systems, Air Force DART analysts can observe activity in a TOC and provide input to operations based on what they are observing.[214]

Such technology not only minimizes the “forward footprint” of deploying additional personnel into theater, thus increasing the drain on logistics and elevating the security requirements, but it also enhances flexibility. Distributed agencies within the United States are then able to provide support to multiple agencies during lag times or to be more effectively integrated with different agencies when missions or theaters change. Again, the intent of Air Force reorganization should not be to improve

[213] Waterman, *Adhocracy,* 18-20.

[214] Jeremiah Burgess, e-mail message to author, June 12, 2008.

interaction with the U.S. Army BCT, but to improve the capability to interact with *any* adhocracy regardless of the echelon or the agency, permitting seamless interaction with joint, coalition or interagency components whether conducting COIN in Iraq or Afghanistan or supporting relief efforts for domestic disaster response.

3. ISR Mission Planning—5 Steps

Traditionally, the BCT began its planning when it received a warning order from higher headquarters.[215] This order typically provided the Division and the Corps objectives and intent with a generic concept of operations. This gave the BCT enough information to begin developing a scheme of maneuver. As the Division and Corps plans became more detailed and specific, the BCT refined its plans and developed its own requests for information and additional assets. The new COIN campaign, centered on the BCT, drives planning from the bottom-up. Therefore, planning procedures must be updated to reflect this more dispersed and compressed planning process. Regardless of how planning is initiated, the planning phase ends with the issuing of orders to subordinate units.[216]

The CAS decision-making process outlined in Joint Publication 3–09.3 is an essential tool for the development of a fire support plan. By modifying this process to account for ISR specific concerns and the changing dynamic of counterinsurgency operations, ISR planning, tasking and execution can be significantly improved. The following guidance has been developed from JP 3–09.3 and should provide clear guidance to all ISR planners for optimizing ISR integration.

Step 1: Receipt of Mission

Although conventional operations for the BCT are typically focused on seizing key terrain or defeating a designated enemy force in the next 24–48 hours, the BCT COIN campaign is a much longer focus that must integrate a host of civil, political and military efforts to accomplish the overall goal of defeating the insurgency and

[215] JP 3–09.3, III-1.

[216] Ibid., III-3.

restoring order and capacity to the local population. Regardless, whether the mission is to seize a hill or restore electrical power, planners must understand the commander's objectives and the utilization of all available capabilities to best support the overall mission.[217] Therefore, before planning can begin, all members of the EWG must understand how the BCT commander defines success.[218]

(1) "Generating" the Mission–Logical Lines of Operation. Conventional operations are typically "enemy centric," focused on defeating the enemy's ability to conduct operations either through annihilation of the enemy force or simply by outmaneuvering it and acquiring dominant positions that prevent effective employment of enemy capabilities. In the COIN campaign, the BCT commander is focused on influencing the Human Terrain of his area of operations with the intent of creating positive reactions from the local populace with regards to the coalition and Government of Iraq (GOI) forces.[219]

(2) Intelligence Requirements. In conventional operations, as observed in the 21–25 March 2003 race to Baghdad, higher headquarters will have access to more intelligence assets, and in developing the top-down plan, will be able to better predict what information subordinate units will require to be successful. COIN intelligence operations, however, are driven from the bottom-up, and the BCTs personnel (through direct interaction with the local populace) will have the best access to the necessary plan. Chasing the Black Market agents in June 2007 was based largely on daily patrol reporting and interaction with the local populace. In fact, 80–90 percent of all information requirements will likely be answered by the BCT itself through the fusion of information generated by organic capabilities.[220] ISR integration requires at least a general understanding of the available ISR order of battle to include the apportionment, allocation, and distribution of higher headquarters assets. Based on this sketch of available assets, the ISRLO and other ISR planners can begin to provide input to the BCT

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[217] JP 3–09.3, III-3.

[218] Guvendiren and Downey, "PIR Development," 2.

[219] Ibid., 2.

[220] Ibid., 6.

commander's initial guidance to include recommending the best assets for supporting BCT objectives and realignment of personnel to support ISR coordination. The ISRLO and the ISR Ops team will be responsible for providing planners with the capabilities and limitations of assigned ISR assets and personnel.

Throughout the mission planning process, ISR planners will focus on developing intelligence requirements. Planners must take a proactive and predictive approach to identifying critical information relevant to the BCT commander's decision making.[221] Understanding that every BCT sector is unique, intelligence requirements are likely to vary greatly from one sector to the next. This will significantly complicate the ability of higher headquarters to classify requirements in easy to template problems and emphasizes the importance of developing accurate intelligence requirements from the beginning. As the name implies, the Priority Intelligence Requirement (PIR) is the most important intelligence requirement to be developed by the intelligence planning team as it will enable the BCT Commander to initiate actions based upon the information provided. For this reason, the PIRs must align with the decisions to be made by the BCT Commander, and if the majority of his decisions are population centric, then the PIRs should not be focused on the enemy.[222] (See Figure 24, The Relationship Between Decisions, Intelligence Requirements, and Information Requirements.)

221 Guvendiren and Downey, "PIR Development," 1.

222 Downey and Guvendiren, "Collection Management," 4.

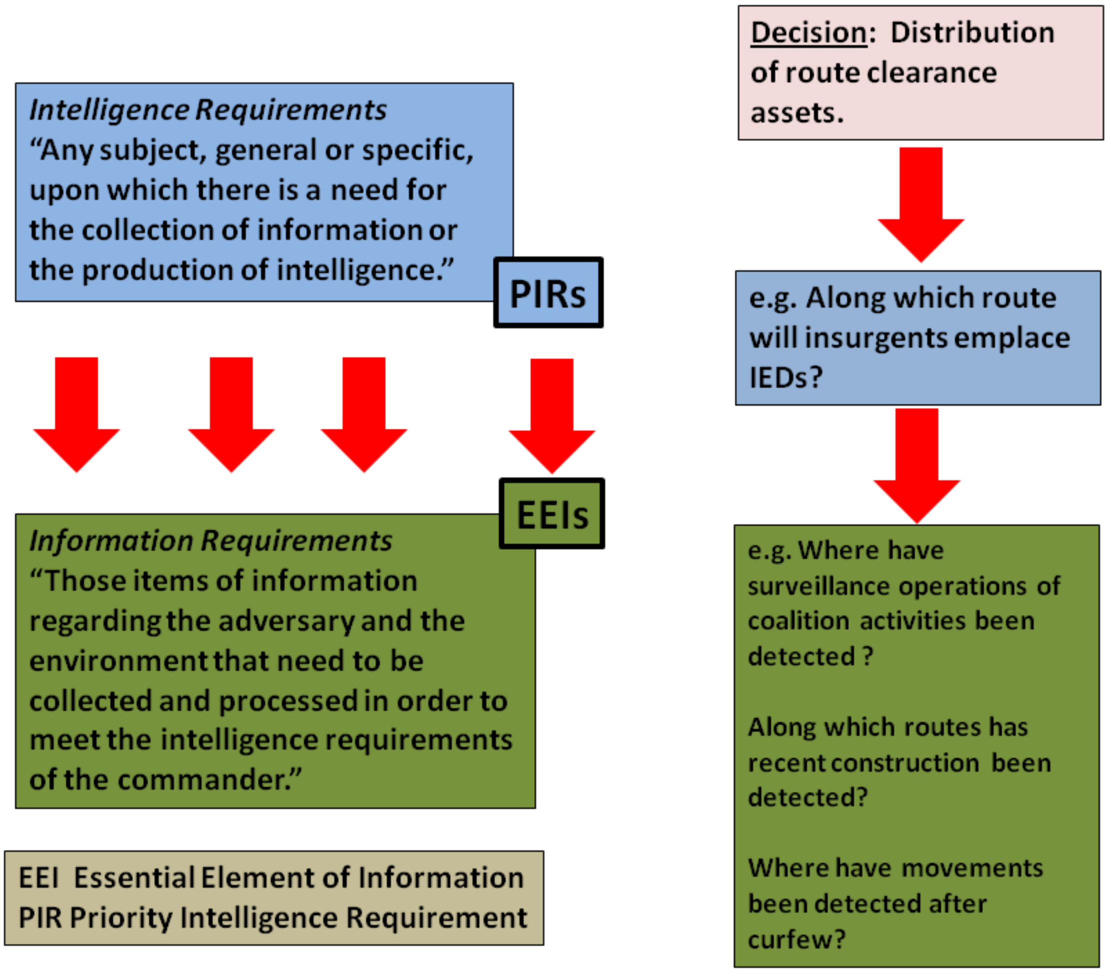


Figure 24. The Relationship Between Decisions, Intelligence Requirements, and Information Requirements[223]

Answering the PIRs is a matter of finding answers to the specific intelligence requirements (SIR) identified by the LOE Chiefs. Each PIR is likely to have more than one SIR associated with it.[224] Answering an SIR should allow the LOE chiefs to make decisions impacting their own mini-campaigns. Therefore, ISR planning at the BCT level is about building the overall campaign plan by answering subsequent questions that promote integration between the lines of effort.[225] (See Figure 25,

[223] JP 2–01, III-5.

[224] Ibid., III-16.

[225] Downey and Guvendiren, "Collection Management," 10.

Matching Lines of Effort (LOEs) to Priority Intelligence Requirements (PIRs) to Decisions.) Finding the right questions to ask is balanced with avoiding seeking too much information (the common tendency among requestors). Planners who request information beyond what is necessary to influence the commander's decisions risk saturating the intelligence infrastructure, and in particular the limited number of intelligence analysts, and needlessly complicating the decision making process by adding "noise," information that doesn't directly contribute to the commander's needs.[226] The ISR Synchronization Plan developed during EWG planning sessions defines the manner in which the intelligence section will strive to fulfill the information needs required to successfully implement the BCT's campaign.[227] This plan must be carefully integrated with the BCT's overall COIN campaign, which will likely focus on providing security for the area of operations as its first phase, developing electricity, water and sewer capacity in the second phase, and then working to assist the local community in developing a self-sustaining economy, a representative government, and improving basic services.[228]

[226] JP 2–01, III-5.

[227] Guvendiren and Downey, "PIR Development," 2.

[228] Ibid., 3.

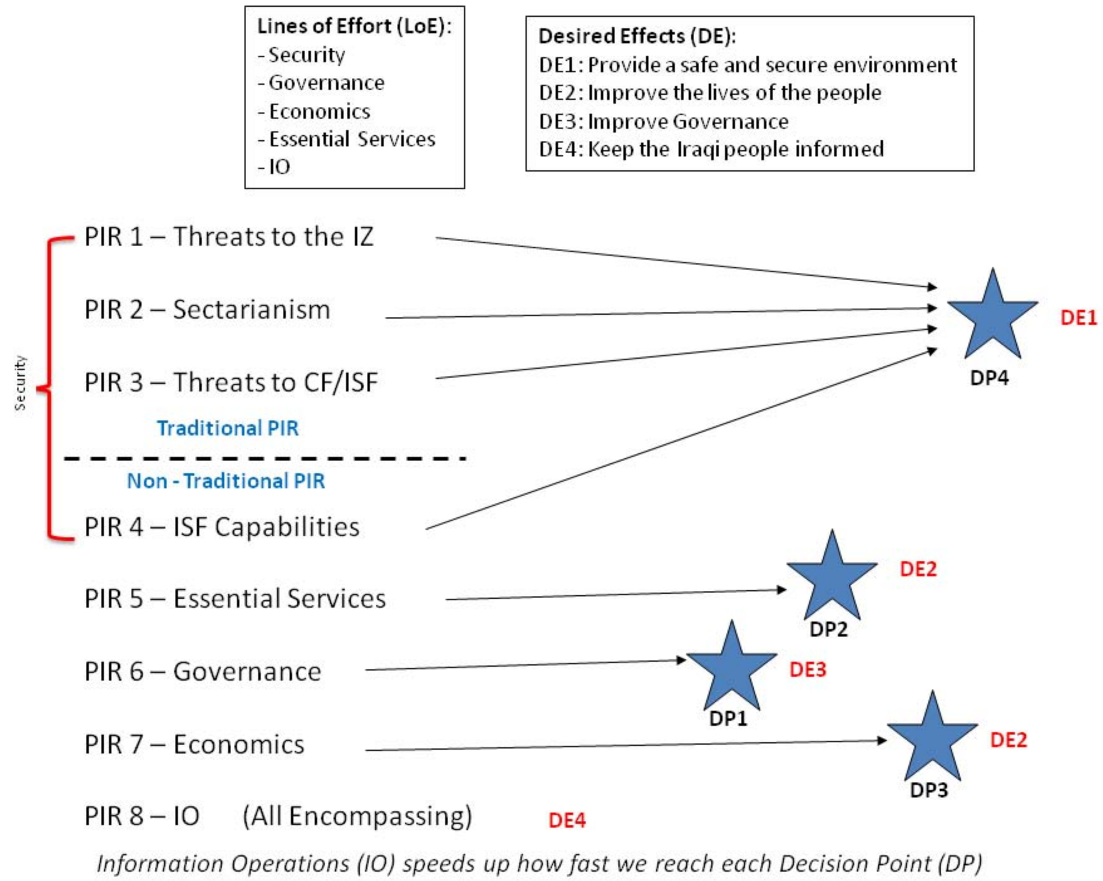


Figure 25. Matching Lines of Effort (LOEs) to Priority Intelligence Requirements (PIRs) to Decisions[229]

Step 2: Mission Analysis

Mission analysis includes determining the specified, implied, and mission essential tasks for all supporting assets. Traditionally, ISR has been tasked largely with supporting "specified" requirements, that is detailed essential elements of information (EEIs) that expressly direct what was to be collected and analyzed. In many cases, however, this has reduced the effectiveness of ISR support to BCT missions as ISR agencies have been unable to provide broader, situation dependent support. By including implied tasks as part of mission analysis, ISR planners both within the BCT

[229] From: Downey and Guvendiren, "Collection Management," 9.

and in supporting agencies can predict areas in which assets may better serve the overall mission or where analyst observations and comments may be appropriate despite deviating from specific EEIs.

Based on this mission analysis, planners can begin developing the mission statement for ISR support and anticipate what ISR assets will be required to support the mission objectives. Based on an understanding of the key elements of the target for collection, planners can begin comparing these target characteristics against the capabilities of available ISR assets in order to determine the best ISR sensor for the collection requirement. Key elements should be fully developed for each target to determine what characteristics of the target can be observed and/or collected.[230] In designating "Every Soldier a Sensor," the Army has begun training its personnel to use their five senses in evaluating their environment to include sight, sounds, distinctive smells, touch (such as the warmth of a fire pit to indicate how recently it was used), and even taste. ISR planners must take this same approach to evaluating target characteristics, not limiting themselves simply to those features that can be observed on imagery or collected via SIGINT. Rather, planners should investigate what kind of residual evidence may be left by the target in the form of moving target indications, specific chemical, vibration, or auditory signatures that can be detected by special sensors, or second tier impacts that might be observed (such as the absence of traffic along a road that locals know has been mined.) A useful mnemonic for ISR planning may include "FM SIGH" which is an abbreviation of full motion video (FMV), measurements and signatures intelligence (MASINT), SIGINT, imagery intelligence (IMINT), ground moving target intelligence (GMTI), and HUMINT. Technically, FMV and GMTI are both forms of IMINT, however, based on the prevalence of their use and the colloquial usage, they are differentiated here. Similarly, certain specialized imagery products are classified as Geospatial Intelligence (GEOINT) or Advanced Geospatial Intelligence (AGI) but are still colloquially referred to as MASINT. Naturally, each

[230] JP 2–01, III-17.

intelligence discipline can be broken down into several subcategories and therefore requires extensive training but this heuristic model should serve to inspire more detailed ISR planning.

Additionally, planners must not limit their concerns to simply collecting information. If the collected information is expected to trigger a kinetic response against the target,[231] planners should consider using a NTISR asset such as fighter aircraft. Fighters using their targeting pods can produce an effect similar to FMV (though with less analytical capability) that could identify a particular vehicle or suspicious activities. Upon confirmation of the vehicle or activity, the fighter is then able to employ munitions against the target immediately if so desired by the land owning commander. The EWG provides the best forum in which all assets, not just ISR assets, can be considered for their potential in meeting collection requirements.

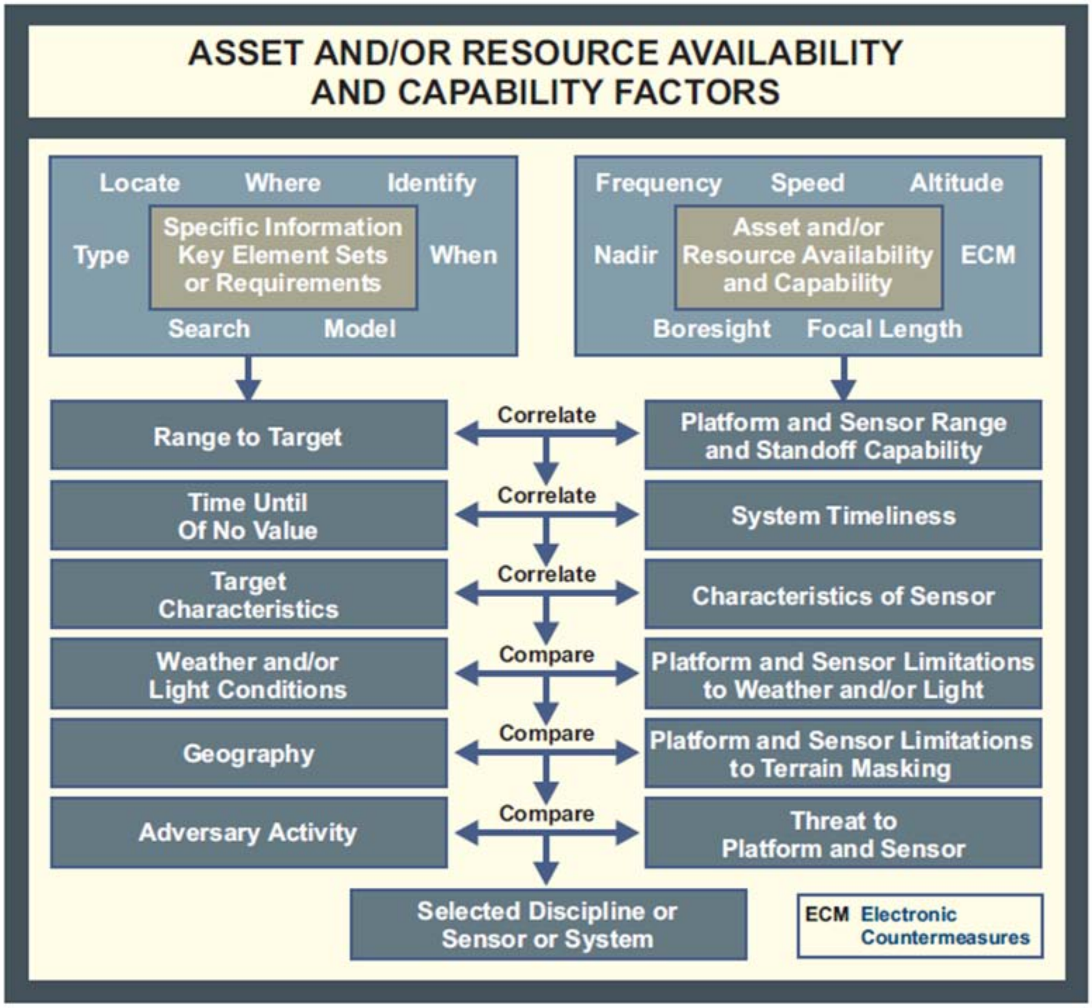
Other key elements to be considered with regards to matching ISR effects against a specific target include the range capabilities of the ISR sensor and the timeliness of the intelligence discipline. Range is typically an issue when considered with regards to compromise of the collection mission. For example, certain low altitude UAVs have distinct auditory signatures that can be masked by flying higher or by moving the asset's orbit further from the target. But in both cases, resolution will be significantly degraded for the sensor. Therefore, planners must consider whether compromise of the mission is a concern and if so, if the degraded resolution will still fulfill the requirement (such as tracking a large vehicle vs. identifying a specific individual). If the sensor will not meet the needs, a different asset or intelligence discipline must be requested. Similarly, the speed of the asset to get to the target area, how long it takes for the asset to collect its information, and how long it will take to process and then disseminate the information to decision makers must also be evaluated.[232] Some high quality and specially developed imaging techniques can reveal quite a bit about a target. Unfortunately, such techniques usually require days or more to acquire. ISR planning timelines must explicitly consider

[231] *Theater ISR CONOPS*, 16.

[232] JP 2–01, III-18.

when intelligence is needed and then work back from that time to establish when collection must be reasonably made to meet that timeline. In many cases, pushing the collection time back too far will make it useless as the activity to be observed will not be present that early. Table 2, Target and Asset Considerations, presents additional target and asset considerations.

Table 2. Target and Asset Considerations[233]



At the end of this step, ISR planners should be able to provide a list of available ISR assets (to include organic assets and those assets that have been aligned by

[233] JP 2–01, III-18.

higher headquarters). Collection management agencies at higher echelons will be responsible for matching specific assets against collection requirements. By providing such managers with the key elements and considerations for the target, a better match can be made by those individuals distanced from BCT planning. Planners should also estimate the risks associated with the various ISR assets to include the possibility of compromising the mission based on asset detection by the enemy, potential areas for delay in receiving and exploiting ISR information, and known limitations to ISR capabilities given a specific environment (for example, difficulties suffered by JSTARS when tracking targets within an urban environment). A warning order should be forwarded to supporting ISR agencies to allow them to begin planning and organizing for future missions. Lastly, ISR planners must ensure that subordinate ISR Ops and ISR Liaison Teams understand the plan and are able to provide the necessary support to the mission.

(1) Principles of Collection Management. Collection Managers (with the support of the Air Force ISRLO) should be involved in every phase of mission planning, working directly with LOE Chiefs in order to anticipate intelligence requirements early. As such requirements are identified, the CM must prioritize requirements in accordance with the BCT Commander's intent, making trade-offs as necessary with the full consultation of the EWG to ensure that a logical progression of intelligence support matches the progression of the COIN campaign. This prioritization will help CMs to determine which taskings should be fulfilled by organic assets, which the BCT has the most control over, and which ones can be pushed to higher headquarters assets with the understanding that the limited number of assets will likely result in many collection requests going unfulfilled. Furthermore, the CM (again with the advice of the ISRLO) must avoid the temptation of spreading ISR around to fulfill as many requirements as possible, and instead use a multidisciplinary approach to overcome system limitations in collecting against higher priority collection requirements.[234] Layering ISR in this fashion is far more effective but less efficient. (See Figure 26,

[234] JP 2–01, III-12–13.

Layered ISR.) It is tempting to task one asset against one requirement and another asset against a different requirement in order to maximize collection but such a tactic is usually less effective and fails to meet the commander's needs on both targets. CMs must use their understanding of the commander's intent and decision-making needs to provide the full-spectrum of effective ISR to cover the most important requirements.

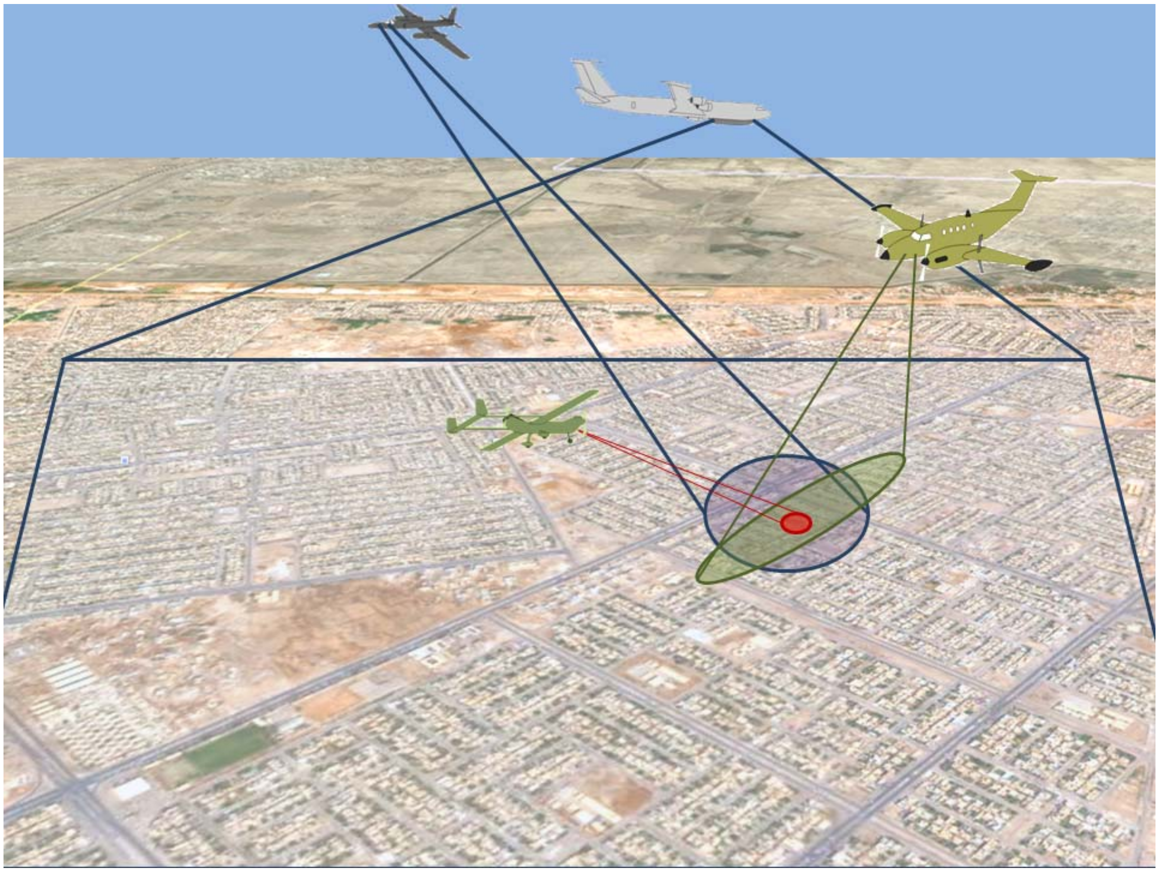


Figure 26. Layered ISR[235]

(2) METT-T considerations. ISR planners can benefit from the use of checklists and decision-making tools, one of the most common of which is the Mission, Enemy, Terrain and Weather, Troops and Support, and Time (METT-T) model.

[235] Depiction shows the large search area of JSTARS, narrowed down by the intercept ellipse of the RC-12 SIGINT collector, refined further by the image area of the U-2 and finally, the "soda straw" view of the RQ-5 Hunter UAV.

Careful consideration of each of these elements will help ensure that ISR is effectively integrated with all other aspects of the BCT operations and predict potential obstacles to successful implementation of the ISR plan.

ISR can execute a number of missions, among these surveillance, reconnaissance, finding, fixing, tracking, support to maneuver, and support to movement. *Surveillance* deals with passive observation over a long dwell time, emphasizing persistent collection typically to provide situational awareness and to highlight changes in the environment over time.[236] *Reconnaissance* focuses on collecting information on a specific target during a short duration, specified timeline.[237] In both of these cases, the intelligence mission is implied to be a prologue to operations. ISR overflies the target area, collects the desired information which is processed and distributed to operations and then maneuver units execute their mission based on this intelligence. This is a very common division of operations in a conventional setting in which intelligence "prepares the battlespace" for maneuver forces to conduct operations.

An increased focus on highly mobile, fleeting targets, typically of small size (individuals or small groups), has dictated a much greater partnership between intelligence and operations personnel. ISR will no longer end their mission prior to operations executing but rather will become an integral part of mission execution, providing real time updates to operations personnel as they conduct their mission. To reflect this interdependent nature of ISR and operations, ISR missions have become more refined. *Finding* a target involves detecting and initially classifying targets for further prosecution.[238] *Fixing* a target provides a location for the target and identification/confirmation.[239] *Tracking* focuses on observing an identified target and monitoring its movement and activity.[240] *Targeting* (from a strictly ISR perspective)

[236] Deptula and Brown, "A House Divided," section "Why Intelligence, Surveillance and Reconnaissance?"

[237] Ibid.

[238] JP 3–60, ix.

[239] Ibid., II-16.

[240] Ibid., x.

involves establishing a target's location to a sufficient degree to permit further actions (striking the target may require more refined coordinates than simply monitoring its activity.)[241] *Support to maneuver* involves the coordination of operations, integrating with fire support and maneuver elements in accomplishing an objective. *Support to movement*, on the other hand, focuses on the movement of friendly forces between positions,[242] during which ISR can warn of impending attacks, identify future obstacles, and coordinate changes in route.

Although counterinsurgency is typically "population centric," the enemy continues to represent a significant obstacle to executing effective COIN strategies. ISR can support COIN efforts by monitoring enemy forces and provide early warning of enemy intentions. As COIN strategies are effectively implemented, ISR can help determine enemy reactions to these efforts, providing a metric by which to measure success or failure of the strategy. Planners, however, must be careful not to focus too much attention on the enemy at the expense of meeting local population needs. The "effects" to be created by the BCT in its operations must be carefully worded to focus on "offensive" operations that focus on building host nation capabilities over the long term versus a defensive effort designed primarily to hunt down and kill the enemy.[243]

Terrain and weather, of course, can significantly impact ISR efforts. Not only can terrain features or weather impede the collection of information, it can prevent the effective communication between ISR assets and the supported unit. Therefore, planners must consider the best orbit placement for ISR assets to improve their ability to execute their mission and to transmit their findings. If necessary, consideration should be made of using some form of communications relay to mitigate any unnecessary delays in getting information to decision makers.

Troops and support planning focuses on ensuring that the appropriate ISR assets are available to meet mission requirements and are integrated into operations. Most important among these considerations is command and control (C2),

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[241] Ibid., II-17.

[242] JP 3–09.3, III-13.

[243] Guvendiren and Downey, "PIR Development," 3.

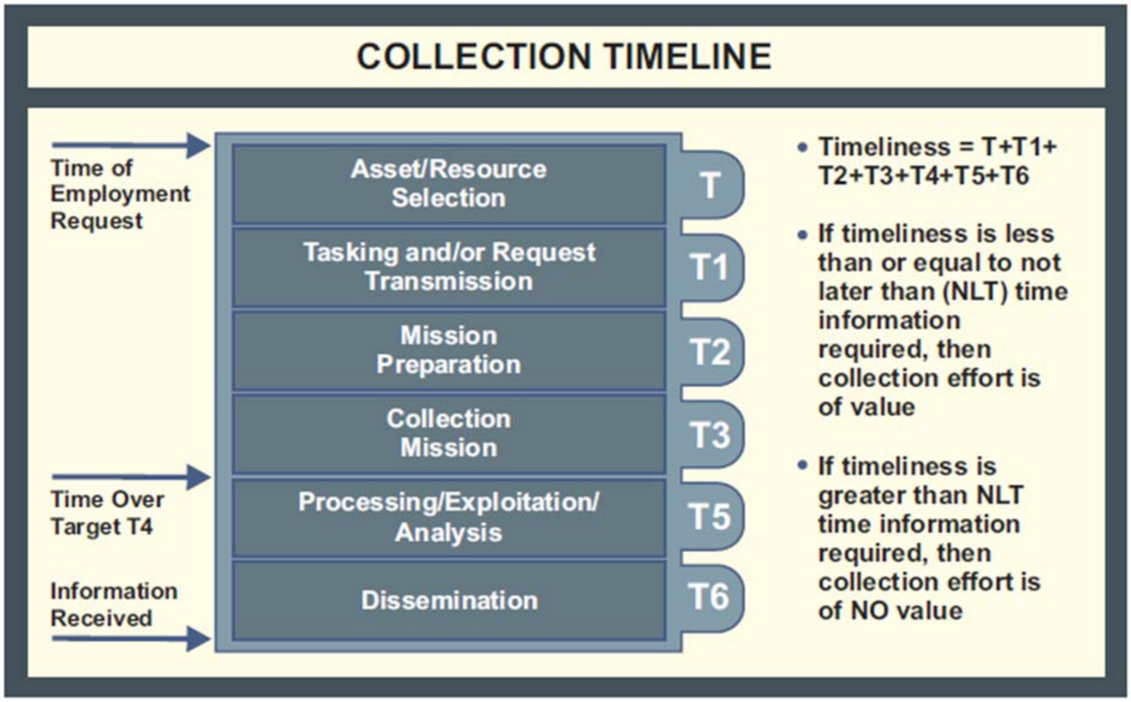
which should be flexible and redundant and included in planning with sufficient detail to prevent confusion. Potential C2 structures can include combinations of radio, Internet relay chat, and secure phone systems. This can generate specific requirements that may need to be forwarded to higher headquarters for support. For example, most ISR assets can communicate via radio but few ISR Operations teams have access to a radio, which may require coordinating via the JTAC. Even with regards to secure telephone systems, not all systems are interoperable and Air Force ISR units may not be able to call Army units because of different types of encryption or firewall restrictions. Lastly, care must be taken in evaluating the capabilities of the available ISR Operations and Liaison teams, ensuring that whatever plan is developed can be executed. Plans that are too task intensive or require experience not present in organic personnel may require the transfer of personnel from other echelons.[244]

Lastly, time considerations should not be overlooked. In some cases, an ISR asset can directly observe a target and provide that information to the decision maker as in the case of FMV provided by a UAV. Other intelligence disciplines, however, require extensive processing to provide decision makers with a useable product. When using such assets, planners must account for the time to collect information, to process that information, and to transmit it to decision makers. If other assets will require such information for cross-cue, they must be appropriately scheduled to provide sufficient lead time to execute the plan. In addition, tasking such assets requires adhering to the air tasking order timeline to guarantee that assets can be tasked and planned for in an appropriate amount of time.[245] (See Table 3, Calculating Asset Timeliness.)

[244] JP 3–09.3, III-15.

[245] Ibid., III-20.

Table 3. Calculating Asset Timeliness[246]



(3) Key Considerations. Key considerations for mission analysis include understanding and disseminating the commander's intent to all involved personnel. This should be fleshed out with a concept for ISR support that includes an indication of how ISR will contribute to the overall mission and ensuring that all ISR assets have been properly integrated with BCT operations. ISR planners should work closely with CAS planners to determine if non-traditional ISR assets (fighters with targeting pods) can be effectively used to augment ISR capabilities. Care must be taken to ensure that CAS assets are not tasked to accomplish a mission already being covered by ISR assets and vice versa.

Finally, ISR planners must develop a detailed communications plan that will specify how maneuver elements, fire support, and ISR personnel will coordinate. Communications must be reliable and redundant as much as possible and every effort must be made to ensure that those decision makers who need ISR

[246] JP 2–01, III-20.

information will have access to it in a timely fashion. One of the most frustrating debriefs from ground personnel is the realization that those under fire were not given access to key, real time ISR that was often available at the Tactical Operations Center.

Mission analysis will end with the production of a preplanned ISR support request, such as collection request submitted via the Planning tool for Integration, Synchronization, and Management (PRISM) system or an ISR coordination request using a form such as the DD Form 1972.1. The DD Form 1972.1 was developed in January 2006 by Air Force Central Command in an effort to better integrate ISR and Operations asset. Initial requests for assets, to include as much of a concept of operation as possible, should be submitted to higher headquarters for tasking. As detailed planning is completed, further refinement can be forwarded to the appropriate tasking authority or to the supporting unit, however, due to the demands of the air tasking order process, timelines should be adhered to as much as possible. The request and tasking process will be discussed in greater detail in Chapter IV.

Step 3: COA Development

After a general concept of operations has been developed during the mission analysis step, planners can begin developing a more specific course of action. The plan that results should be comprehensive yet flexible and while creativity should be encouraged, planners must remain focused on the commander's intent and in meeting established timelines. (See Figure 27, Example ISR Synchronization Matrix.)

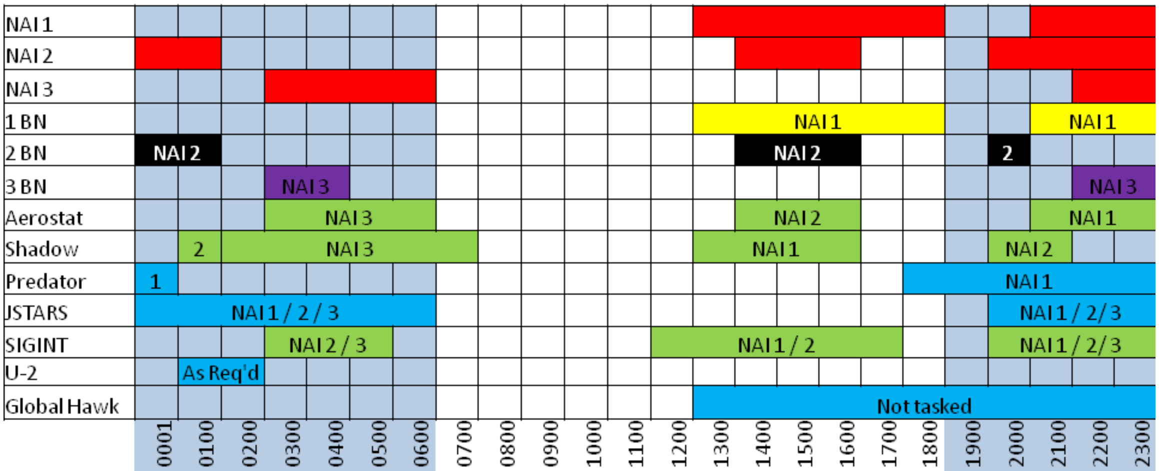


Figure 27. Example ISR Synchronization Matrix[247]

(1) Generating the Plan. ISR capabilities should be matched against desired effects, considering the best possible intelligence discipline for each type of target and leveraging the benefits of ISR layering. The different combinations of ISR assets, capabilities, and layering should provide a number of different courses of action (COA). These COA must be feasible, distinguishable and complete ensuring that anyone of these COAs could be selected for final execution and that variations in the situation can be easily dealt with during execution. Through integration with the DART, the ISRLO, and available ISR unit mission planners, detailed plans should be coordinated.[248] It is understood that assets planned for in this stage have yet to be tasked through the formal process and it is very possible that the units with which planning was coordinated may not in fact be available for mission execution. Fortunately, the planning that they assisted with should be able to support other assets and capabilities with only minor refinements made after tasking has occurred. This process will allow ISR planning to

[247] After: FMI 2–01, 3–5. The ISR Synchronization Matrix lists a BCT's "named areas of interest" (NAIs) and the times insurgents are expected to be active within those NAIS (shown in red). The patrolling schedule for each of the BCT's battalions also includes which NAI they will be patrolling. Similarly each ISR asset's active window is depicted to include its NAI focus. The vertical blue areas represent times during which there is insufficient light for electro-optical devices (twilight, night, and early morning).

[248] *Theater ISR CONOPS*, 12.

become a parallel function once more, rather than a time compressed sequential process in which coordination has to be conducted just prior to mission execution.

One concern with conducting mission planning in this fashion, however, is that personnel needed for planning may in fact already be involved in coordinating missions that have been tasked and are about to be executed. For this reason, it may be necessary to stand up mission planning cells outside of the theater of operations in which crews that are not deployed provide initial planning guidance to be refined once in theater crews have been tasked. It could therefore be possible for JSTARS mission planners based at Warner-Robbins Air National Guard Base in Georgia to assist BCT planners in Baghdad in order to sketch plans prior to tasking. This is, of course, not an ideal situation as units in garrison are often focused on re-training and decompressing after recent deployments. An alternative would be to deploy more experienced mission planners into theater to deal with such long range planning without impacting the flying crews themselves.

For each COA, an ISR scheme of maneuver must be developed that supports the BCT operation. This scheme of maneuver must anticipate timing considerations (the amount of time to collect intelligence, process it, analyze the information, and disseminate it to the appropriate users) as well as requirements for ISR Ops/Liaison teams to execute the plan. This should include designating specific targets to be collected against, named areas of interest, and even airspace considerations (to be worked out with the Air Liaison Officer to ensure deconfliction of all airborne assets). How ISR assets enter and exit the battlespace and any necessary air coordination measures must be identified at this time. Similarly, the communications plan identified in Step 2 should also be carefully reviewed with regards to various ISR COAs. Lastly, a clear priority of support must be established to identify which units will require ISR support before other units. This identification should also guarantee that the unit has the necessary communications or liaison support to receive available ISR support when needed. In the end, each COA should represent a fully integrated product that combines ISR support with maneuver unit schemes of maneuver, fire support plans, and deconfliction from the electronic warfare plan.

(2) ISR Integration—Layering, Massing, and Swarming. ISR support is not limited to traditional assets such as UAVs or manned aircraft and collection managers/ISR planners must avoid favoring or becoming too reliant on any one sensor. ISR is most effective when a multidisciplinary approach is taken, allowing sensors and capabilities to complement one another.[249] While HUMINT has proven to be vital in COIN operations, such intelligence is not limited simply to trained HUMINT teams. Rather, the Army has adopted the concept of "Every Soldier is a Sensor" (ES2) and valuable information will be derived from patrols, key leadership engagements between BCT leaders and local governance, reconciliation meetings, tip lines developed to gather information anonymously from the local population, and reports generated by the observation of logistics convoys that pass through the battlespace.[250] ISR planners must account for these various sources of information as they develop their integration for more traditional assets.

ISR assets will typically be able to collect against multiple targets within a single mission. On other occasions, it may be necessary for multiple ISR assets to be tasked against a single high priority requirement to ensure that it is satisfied. In some cases, this may be a matter of using one type of sensor to cue another sensor to a collection requirement.[251] For example, most FMV systems have a very narrow field of view and fly slowly in order to sufficiently evaluate the target area. This prevents them from covering a very large area. GMTI systems can cover very large areas, detecting movement anywhere within an area of the size of Baghdad. GMTI systems tend to have poor fidelity (actual locations could be several meters off) and they have no ability to identify a target as anything more than a moving vehicle (so they are unable to track or identify a specific vehicle). When combined, GMTI provides an excellent ability to direct FMV assets to targets throughout the battlespace, allowing the FMV system to

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[249] Air Force Doctrine Document 2–9, *Intelligence, Surveillance, and Reconnaissance Operations*, July 17, 2007, 14.

[250] Guvendiren and Downey, "PIR Development," 1.

[251] JP 2–01, III-23.

provide confirmation of the target's identity and to refine its location to targetable coordinates.[252] (See Table 4, Intelligence Disciplines and Cross-cueing Requirements.)

Table 4. Intelligence Disciplines and Cross-cueing Requirements

	FIND[1]	FIX[2]	TRACK[3]	TARGET[4]
FMV[5]	P	M	G	G
MASINT	G	M	P	P
SIGINT	G	G	M	P
IMINT	P	M	P	G
GMTI	G	P	G	P
HUMINT[6]	G	G	P	M

P Poor capability; may not provide useable information even with cross-cue

M Moderate capability; requires cross-cuing to provide useable information

G Good capability; may not require cross-cuing to provide useable information

[1] Evaluates ability to search wide areas for a potential target
[2] Evaluates ability to provide identification of target
[3] Evaluates ability to maintain positional information for a moving target
[4] Evaluates ability to provide precise/accurate coordinates
[5] Includes fighter aircraft with targeting pods
[6] Includes patrol reporting, tip line information, and informants/interrogation information

When one asset alone is insufficient to providing all of the necessary data regarding a high priority target, a mixture of sensors and/or assets may be required to meet collection requirement demands. Tracking a high value individual may begin with the use of SIGINT to determine his location. While certain SIGINT systems may be able to provide highly accurate coordinates, they may not be sufficient for

[252] Benjamin S. Lambeth, *Air Power Against Terror: America's Conduct of Operation Enduring Freedom*, (Santa Monica, CA: RAND Corporation, 2005), 255.

identifying the individual communicating. In that case, it may be necessary to coordinate FMV or HUMINT coverage to positively ID the target or to confirm the absence of unintended targets in the vicinity. Additionally, more than one sensor of the same type maybe necessary to ensure redundancy or to allow for multiple targets. For example, when targeting a compound, one FMV asset may be sufficient for providing situational awareness for the commander but if multiple targets escape the compound ("squirt"), multiple FMV assets will be required to follow all of the "squirters." Naturally, mixing assets in such cases can be highly taxing on the limited number of ISR assets available.[253] But again, CMs must ensure that their ISR plan accounts for the commander's priorities and meets those requirements and does not simply spread ISR ineffectively over several different targets simply to satisfy more "customers."

Step 4: COA Analysis/Wargaming

During wargaming, ISR planners will be responsible for tracking the effectiveness of the ISR COAs and determining which COA provides the best support to BCT operations. Among the considerations for ISR planners is the refinement of asset operating altitudes to ensure safety of flight for all airborne ISR assets as well as to promote sensor effectiveness. Planners should also highlight any specific ISR tactics to be considered as well as procedures that must be followed for the coordination of ISR effects. Terrain and weather effects that may impact ISR support should also be highlighted and coordinated with the staff weather officer to pre-empt any potential problems before requesting specific assets.

The wargaming process will highlight critical events and decisions points which the ISR planners should use as key focus points for their plan. As other assets execute their plan, ISR planners should take note of any additional deconfliction measures necessary both in terms of airspace and communications. Signals intelligence assets in particular must be deconflicted with electronic warfare efforts to ensure that communications to be collected are not deliberately or accidently jammed. Criteria for

[253] JP 2–01, III-23–24.

selecting the best COA will likely involve timeliness of support, flexibility of the plan, the ability to mass assets as necessary, and the accomplishment of desired effects. By the end of the wargaming process, it should be apparent whether the ISR plan supported the commander's intent, was effectively integrated with other assets, and if coordination during execution can be successfully accomplished. The COA that provides the best option for meeting the commander's intent should then be developed into a reconnaissance and surveillance (R&S) plan.

Step 5: Orders Production

Having identified the preferred course of action for ISR employment, planners will formalize the plan in an OPORD with the appropriate R&S annex. This order should be clear and concise, providing subordinate and supporting elements with all necessary information required for execution. Unnecessary restraints should be excluded from the plan, allowing element leaders to execute the mission with creativity and initiative.

(1) ISR Mission Type Orders. Mission Type Orders (MTOs) use narratives to focus subordinate and supporting unit efforts for effective operations while providing lower-level commanders with the flexibility to execute initiative in accomplishing the commander's intent.[254] MTOs are very common with the Army and particularly with maneuver units but are not used with regards to ISR support, though organic Army ISR operators typically receive copies of the supported MTO to enhance their awareness.[255] Such explicit and implicit guidance, combined with an understanding of what other elements of the mission will be accomplishing, will significantly improve the ISR support provided to the BCT. MTOs typically consist of the commander's intent, the task to be accomplished and the purpose of that task in accomplishing the overall mission but leaves the details of planning and mission execution to tactical commanders and crews.[256] Ultimately, the MTO documents the coordination and agreements made

[254] *Theater ISR CONOPS*, 18.

[255] Cheater, "The War Over Warrior," 15.

[256] *Theater ISR CONOPS*, 18.

between the supported BCT and the supporting assets and serves as a “contract” for mission execution.[257] To ensure that all elements are aware of the available capabilities on the mission and that sufficient coordination has been made to disseminate information to all those who may require it, ISR MTOs should not be separate from the overall plan. Recognizing that ISR assets may support multiple operations in a single sortie, it may be necessary for the Combined Air and Space Operations Center to issue a broader MTO to establish ISR effects and synchronization across the theater.[258] (See Appendix C for an example of a graphical MTO.)

(2) Standardized EEIs. In an effort to improve ISR support to unit operations, collection managers began producing “novel-length” narratives for their EEIs. These highly detailed explanations of what was required for ISR support were necessitated by a lack of TTPs within the ISR community for dealing with counterinsurgency problems. A JSTARS crew understood the tactical formations of an Iraqi tank battalion and could recognize patterns of movement that would indicate flanking maneuvers or road marches. While this information was very useful in the dust storm of March 2003, it proved of little value when attempting to identify the locations of IEDs along the roads within Baghdad. Instead, military intelligence analysts assigned to the BCTs began to develop their own guidance for the JSTARS crews (and other ISR agencies) explaining how they *believed* IED emplacements would appear to the JSTARS.

Based on experience and previous training, some collection managers understood the capabilities and limitations of the systems better than others. This created significant imbalance in the level of ISR support provided to one BCT over another. With the addition of the ISRLOs at the Division level, such asymmetry was overcome as EEIs could be more carefully refined before submission to CFACC ISR. The length of the EEIs continued to be counterproductive as they limited the flexibility of ISR assets and even which ISR assets could be assigned to meet that requirement. If an

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[257] *Theater ISR CONOPS,* 19.

[258] Ibid., 19.

EEI was written specifically for imagery support provided by the U-2, but there were insufficient collection opportunities on the next U-2 mission, that request had to be denied.

In an effort to alleviate this problem, ISRLOs in 2007, working with a draft product developed by the Air Force Special Operations Command for their own ISR assets, developed a series of standardized EEIs intended to free collection managers from the task of "novel writing" and to spare ISR assets from reading through extensive directions on how to accomplish their missions. The vision was for CMs to simply reference a particular collection requirement ("identify IEDS along route Red") and for the ISR assets/crews to be able to reference their own specific EEIs for meeting that requirement. In this fashion, as ISR crews became more accomplished at certain missions, they would develop better TTPs (beyond the understanding of the supported CM) or would acquire new technologies that would enable them to answer the question in different manners than what the CM may have been previously trained.

Unfortunately, the use of standardized EEIs was only effective for recurrent missions such as searching for IEDs or monitoring a target house during a high value individual capture. Less common missions, particularly those associated with non-kinetic COIN efforts, were harder to standardize and often left the analysts with insufficient guidance on how to fulfill the requests. What was required was a combination of the flexibility to use their systems and expertise to the fullest extent while having a sufficient understanding of the supported unit's needs.

(3) ISR Tasks. Instead of focusing on individual collection requests, submitted without context, ISR units needed access to the reconnaissance and surveillance plan developed by the ISR planners in coordination with the rest of the EWG. This R&S plan will refine ISR tasks, indicating specific purposes and desired effects for ISR support. (See Figure 28, Building ISR Tasks.) ISR *tasks* describe the objectives that ISR must achieve against a specific target.[259] A COIN task can be complicated explanations compared to conventional ISR taskings. Previously, an

[259] JP 3–09.3, III-9.

imagery analyst may only have been tasked with reporting the number of enemy vehicles in a collected image. In a population centric COIN strategy, that analyst may now be required to report on details for which their technical training did not prepare them. In that case, it may be necessary to provide very specific guidance developed by the BCT subject matter expert (SME) that will allow the SME to use the information provided by the analyst to determine the advancement of a certain LOE.[260]

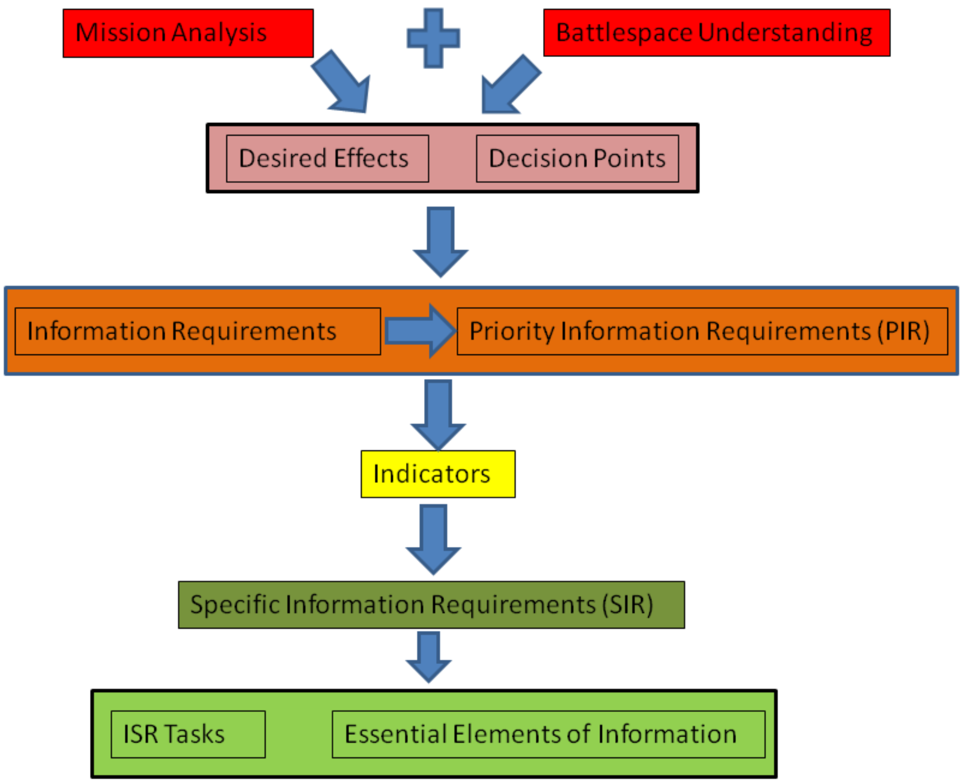

Figure 28. Building ISR Tasks

Purpose explains how ISR will contribute to the success of the BCT operation, usually formatted as "in order to…" More importantly, purpose provides the ISR asset with an understanding of how their information fits into the big picture. Most assets, whether they are HUMINT teams or UAV pilots, believe that they understand better than the requestor what intelligence is required. While the assets do

[260] Downey and Guvendiren, "Collection Management," 12.

tend to have a more refined understanding of their capabilities and what they can provide, they often have a very narrow field of view with regards to their integration with other assets and the operations of the BCT. Purposes provide the larger view that individual assets require.[261] While tasks may then identify specific requirements for mission accomplishment, the purpose statement helps the ISR asset to understand how they can contribute to the mission and therefore provides the flexibility required to take the initiative and solve additional problems if able. The *desired effects* of ISR should provide a quantifiable assessment to determine if ISR was successful in the accomplishment of its assigned task.

Using this Task/Purpose construct helps to alleviate one of the enduring problems of ISR support, the question of "why didn't you tell me that?" For example, an ISR unit may be tasked with identifying potential IED locations along a series of routes. In identifying the potential IEDs, the imagery analysts also observes that one of the routes has been blocked by the rubble of a building previously struck by close air support. This information is not included in the report, however, because it was not one of the "essential elements of information." The customer receiving the IED report reroutes the convoy to the route that has been blocked by rubble and wastes crucial minutes in finding yet another way around, potentially risking lives in an ambush. When the feedback for the ISR support is submitted it is noted that the rubble strewn road was not annotated on imagery. The Imagery Analyst complains that they were not instructed to provide such information and the trust between the U.S. Army and the U.S. Air Force deteriorates further.

In contrast, the request for ISR support could have been crafted as follows:

- TASK: Identify any potential IED emplacement areas along routes Alpha, Bravo, and Charlie.
- PURPOSE: In order to facilitate movement of 2–1 AD convoy from Camp Liberty to Al Mansour.

[261] Downey and Guvendiren, "Collection Management," 11.

- DESIRED EFFECTS: Successful movement of 2–1 AD convoy without unnecessary delays.

With such guidance in hand, imagery analysts are now able to focus on reporting potential IED locations but now understand that such reports are not being used solely to guide explosive ordnance disposal (EOD) clearance teams to the location but rather, to permit the movement of the convoy. Now, if an analyst observes rubble blocking the route or even indications of a possible ambush, the analyst understands the importance of reporting this information as well. In this fashion, the ISR units now become part of the team and can better support the solution to dynamic, wicked problems faced by the supported unit.

D. CONCLUSION

1. ISR Planning for the 21 June 2007—Chasing Black Marketers

As discussed in Chapter I, 2–82 ABN attempted to employ ISR in support of tactical operations. Unfortunately, planning was limited to requesting an FMV asset and then identifying the target location that the asset would be tasked with observing in the traditional collection management process. As the collection manager for 2–82 was also the imagery analyst for the BCT and the ISR Operations representative on the TOC floor, it is understandable that she had limited opportunity to develop a more robust ISR plan or be in possession of the training and experience necessary for understanding how to better integrate ISR into the overall plan. Even if detailed planning had been conducted for the Shadow, the information developed (following the process outlined in this chapter) would have significantly improved the Predator's ability to support the mission. The fact that the tasking process resulted in pulling of the asset may only have pre-empted an unsuccessful demonstration of ISR support to the BCT's operations.

This example was symptomatic of ISR planning in general, though there were some more capable CMs (based on manning, experience, or training) who did develop more robust plans. In most cases, ISR planning was limited to requesting one type of collection against a specific target with the expectation that the BCT S2 analysts would receive the products and integrate it with other products. ISR was rarely used to cue

other assets or to provide direct support to on-going operations. For example, imagery might be tasked to identify potential IED locations along a route. CAS aircraft may also be tasked to search along the same route for suspicious activity or infrared signatures that might indicate IED locations. Unfortunately, the CAS pilots were not provided with locations identified on imagery and rarely were IED locations highlighted by CAS forwarded to the analysis section for inclusion in their all-source products. Common Ground Station (CGS) operators who could view the GMTI from JSTARS might build “pattern of life” products indicating trends in traffic over time but they did not typically cue organic FMV assets to suspicious activity occurring after curfew. ISR planning at this time was largely focused on formalizing collection requests rather than developing an actual ISR strategy integrated with BCT operations.

Had ISR planning been conducted in coordination with a fully represented EWG (to include ISRLO, ALO, and DART virtual presence), the lack of such integration could have been identified. Furthermore, the additions of these planners may have highlighted alternative options for solving the problems or provided the experience necessary for better integration of the selected options. Not all ISR operations were planned in such piecemeal fashions.

2. ISR Planning for Operation BK FAMINE (June–July 2007)[262]

In contrast, a comprehensive ISR plan was developed by the EWG of 2–1 AD BCT with support from the Division ISRLO and Collection Manager. In developing their COIN campaign for the Al Mansour neighborhood in western Baghdad (see Figure 29, Red Circle Indicates 2–1AD BCT's Area of Operations in June–July 2007), LOE Chiefs identified the difficulties in working in the area. Due to the fact that their units were based on Camp Liberty on the Victory Base Complex (VBC), they had to “commute” to their neighborhoods in order to conduct various construction projects or to interact with community leaders. (Combat Out Posts in the area maintained a U.S. military presence

[262] This mission is based on one that did in fact occur in June and July 2007. The author observed the process as outlined here, though certain details have been altered to preserve operational security and to refine the narrative for ease of understanding.

but BCT enablers typically resided on the Forward Operating Base until needed.) During these commutes, their units often suffered casualties or at the very least delays in reaching their objective areas due to the improvised explosive device (IED) threat. Although the focus of their COIN campaign was improving the local capacity for the civilian population, the IEDs were becoming an obstacle to those aims and needed to be addressed.

Figure 29. Red Circle Indicates 2–1AD BCT's Area of Operations in June–July 2007[263]

Considered an obstacle to maneuver, the BCT had learned over the past 10 months that attempts to eliminate the IED cells were futile. Even when a networked approach to IEDs was taken and cell leaders, bomb makers, and financiers were captured or eliminated, the IED cell (or a rival cell) eventually recovered and continued

[263] Institute for the Study of War, "Map of Baghdad Neighborhoods," www.understandingwar.org/files/Baghdad.jpg, (accessed October 23, 2009).

operations. The best case scenario, from the point of view of 2–1 AD, was that they could incur a two to four week hiatus in effective IED attacks as the cell recovered and inexperienced bomb makers or emplacement teams learned their trade. The freedom of maneuver created by that delay, however, may be sufficient for the BCT to accomplish many of its COIN objectives and develop invaluable access to the community which in turn would deny the neighborhood to the IED emplacers. Once the local population recognized that the American forces were not going to leave and that they were intent on improving the average Iraqi's life, it was believed, the insurgents would begin to lose ground in that area and would be forced to conduct operations elsewhere.

Since the 2–1 AD TOC was in close proximity to the Division headquarters on Camp Liberty, the 2–1 AD EWG was able to coordinate face-to-face with Division ISR personnel to include the CFACC provided ISRLO. This gave the BCT access to personnel experienced in ISR planning and simply more bodies with which to conduct planning while the 2–1 AD CM continued to support other operations. The result of this planning was codenamed Operation BK FAMINE and was designed to be a long term, counter IED (CIED) campaign designed to assure BCT mobility in the Al Mansour neighborhood.

The most immediate threats, of course, were those IEDs that had already been emplaced along the route of travel from VBC to the neighborhood. It would therefore be necessary to locate and clear (or avoid) suspected IED locations along the route. This, of course, would be only a very short solution as many insurgent groups had developed the tactic of "re-seeding" the route after clearance teams had passed through the area. For this reason, ISR would need to provide overwatch support to the route clearance team during their operations and along the route immediately after it had been cleared. Long duration ISR would provide cues to potential IED locations in advance of route clearance to limit their vulnerability to attack as well. (See Figure 30, Layered ISR in the Counter-IED Fight.)

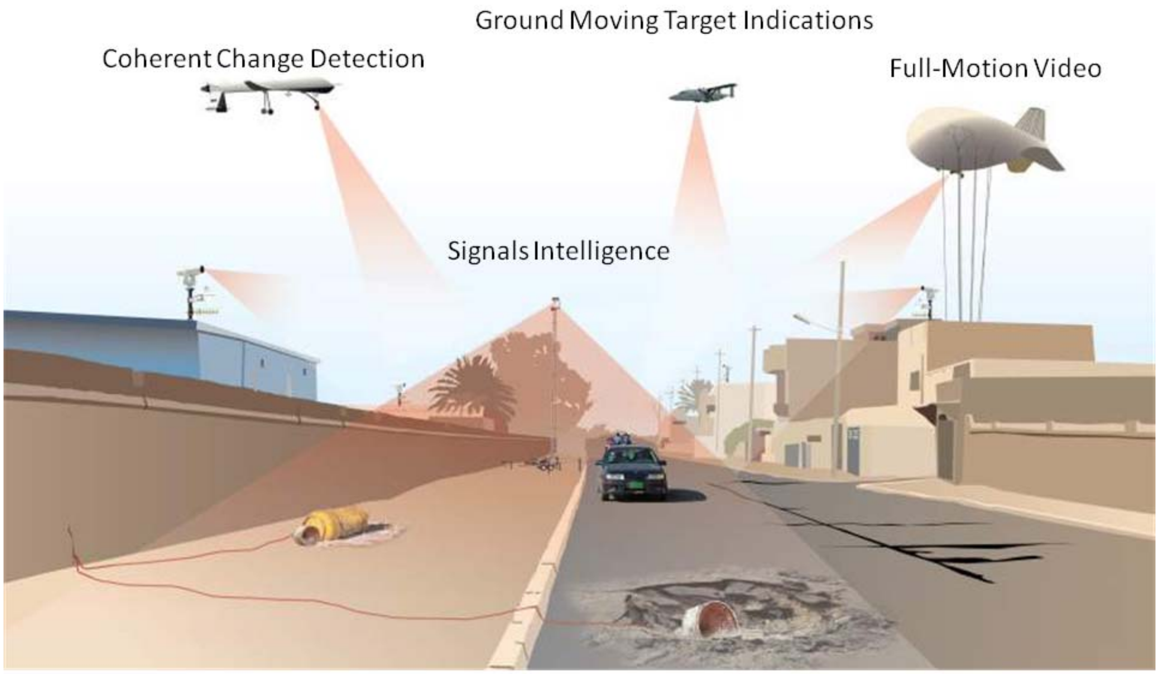

Figure 30. Layered ISR in the Counter-IED Fight[264]

The target signatures of an emplaced IED were considered and then aligned with various ISR capabilities. To begin with, an emplaced IED can be observed "visually" either by identifying the device itself or certain associated activities. The device itself was often camouflaged to blend with the complicated clutter of the urban environment (trash, construction materials, animal carcasses, etc.). For this reason, using FMV or imagery to simply identify the IED itself was likely to be of little utility. It might be possible, however, to image either the trigger man or the observer as they awaited the approach of a convoy. Due to the barriers constructed around the various Baghdad neighborhoods, the ability of the IED triggerman to detonate his device at the appropriate time was severely limited either because he could not see the approaching convoy or

[264] After: Robin L. Keesee, (presentation to JIEDDO Cooperative Opportunities International Acquisition Forum XXII," Washington DC, May 30, 2007), slide 14.

could not extend his detonating wires/signals far enough from the device. This made the triggerman and his observer vulnerable to detection, though during non-curfew hours this was of little value.

The infrared signature of most IEDs is indistinguishable from the surrounding clutter. Though the device was made from military ordnance (old artillery shells, recovered aerial bombs that had failed to detonate, modified mines, etc.), their infrared (IR) signature was a factor of the environment (weather, direct sunlight, etc.) and therefore replicated the effects of other urban materials. Therefore, surface laid IEDs were difficult for most ISR assets to detect and relied on the keen eyes of soldiers moving through the area. IEDs that had been buried under the street or nearby, however, were vulnerable to detection based on the fact that such "disturbed earth" often had a different IR signature than the ground around it. For this reason, IR assets (either imagery or FMV) could be used to identify potential IED locations based on the disturbed earth. (Potholes that had been recently filled in or other similar forms of construction would of course be mistaken for IED locations).

Since IEDs were typically made of dense metal munitions, radar signatures could be useful in highlighting "radar significant objects" in close proximity to road. Again, by itself, this signature may not be particularly useful, but if combined with the IR signature indicating that there was a radar significant device within disturbed earth, the potential for that being an IED increased. It may also have been possible to identify the wires used to detonate the device if they were laid atop the ground although this was likely a low probability of success, particularly in an urban environment.

As noted with the IR signature, disturbed earth was important because it represented a change from its surroundings. Therefore, it might be possible to use radar imagery to detect changes from one image to the next (assuming the two images were taken over a matter of hours or days), known as coherent change detection.[265] Ideally, the first image would be taken prior to when the S2 estimated that insurgents were

[265]Sandia National Laboratories, "Synthetic Aperture Radar Applications," http://www.sandia.gov/radar/sarapps.html, (accessed July 10, 2009).

implanting their devices and the second image prior to when the route clearance team or the convoy left VBC. Due to the strict flight requirements and the limited number of imaging opportunities each day, it was unlikely that both images would be taken on the same day. Instead, images would need to be separated by days and in the hectic environment of a city, such changes might go unnoticed because of so many other changes in the scene.

"Acoustically," the IED itself does not emit any detectable signals. Although, it may be possible to detect signals associated with the IED to include radio frequencies used to arm the device prior to detonation (sometimes used by the insurgents to prevent early detonation of victim triggered devices by innocent civilians) or the communications between the target spotter and the triggerman. In both cases, the signal would be detected only moments before the device was detonated but it was still a valid target signature to be considered.

A growing effort was focused on detecting the material signature of the devices such as the explosive materials involved. Unfortunately, based on the ISRLO's experience such capabilities were either unavailable for tasking or were analytically intensive and would therefore limit their utility with regards to early warning of convoys moving through a specific area in a given time frame.

Lastly, ISR planners looked at the potential to identify movement associated with the IED. Obviously, the device itself would not move and the triggerman or observer was likely to be operating on foot. But when the device was emplaced, it may have been dropped off from a vehicle or been emplaced by someone walking to and from a nearby "get away car." During curfew hours, this could be useful information. During the day, in a congested urban area, it was going to be lost among the "noise" of legitimate day-to-day activities.

Regardless, the ISRLO, the Division Collection Manager, the BCT S2, and the ALO were able to develop an ISR plan to support movement from VBC to Al Mansour. To begin with, a radar imagery pass was planned for the start of each target window (when insurgents were believed to be burying IEDs along the route of travel). The first

night, the image would simply be analyzed for radar significant objects and correlated to any other ISR findings. On subsequent nights, the images would be compared to one another to detect changes that might indicate the emplacement of an explosive device.

The CGS operators were directed to provide notifications of any suspicious vehicle activity that occurred along the route of travel. In particular, they were to highlight vehicles that stopped along the route of travel and then made circuitous routes back to their point of origin, vehicles that stopped within a given distance to the route and then again returned to a point of origin, or vehicles that followed or drove on an "intercept course" toward the route clearance team during its operations.

The ALO worked to get CAS assets made available to support the mission in the event that there were insufficient FMV assets available. CAS assets had the advantage of moving more rapidly around the battlespace, and could therefore check out more suspicious locations, could talk directly to the convoys via radio, and if necessary, could employ weapons against suspected triggermen, observers, or emplacement teams (though this was highly unlikely). In comparison, the slower flying UAVs typically lacked direct radio communications with ground personnel nor did they have the ability to employ weapons (in most cases) but they did have a longer loiter time which would allow them to spend more time searching the roads at a slower rate of travel with the potential for better fidelity. While pilots in fighter aircraft had to focus on flying the aircraft and only delegate a portion of their time to watching the video feed from their targeting pod, there was both a pilot and a sensor operator controlling a UAV, allowing for a more consistent observation of the video feed.

In both cases, the fighter pilot and the sensor operators were encouraged to focus first and foremost on suspicious activity such as personnel digging alongside roads, vehicles stopped on the shoulder of the road for no apparent reason, or individuals loitering after curfew. IR significant areas along roads were to be reported to include a verbal description of the location relative to observable landmarks (to ease the guidance of clearance teams to the potential device).

Signals intelligence assets were requested to provide earlier warning of potential device employment during route clearance operations and during convoy movements. Such information would be fed rapidly to the ground unit to halt or modify their movements and to the JTAC to ensure that CAS could be rapidly brought to bear either to provide an IR search for the device or to support a troops in contact situation should they come under fire from a supporting ambush.

Coordination was carefully worked out to ensure that imagery products were quickly provided to the ISR Ops soldier and the JTAC in the BCT TOC. The CGS Operators were similarly directed to contact the ISR Ops soldier and the JTAC with any suspicious activity. In this fashion, the UAV or CAS aircraft would not simply be looking up and down roads but would be cued to other suspicious activity. Although all ISR indications of a possible IED would be considered carefully with regards to the safety of the convoy, actioning such targets would largely depend on a correlation of the various signatures to ensure that EOD soldiers were not needlessly put into a potential ambush situation for something that turned out to be a false alarm.

To have a longer term effect (measured in weeks vice hours), EWG planners needed to eliminate the IED cell and its available munitions. Though some insurgent groups had begun to use homemade explosives, military munitions were still the preferred base for IEDs in this area of operations. It would therefore be necessary to identify cache sites within the neighborhood from which the weapons were quickly taken and then emplaced as well as to cut-off the "ratlines" used by the insurgents to smuggle the weapons into Baghdad.

The S2 provided ISR planners with an all source product highlighting suspected cache locations based on previous engagements, HUMIT reporting, and tip line results. Often, such locations were narrowed down to a particular block of houses but were not sufficient for targeting a specific house. This level of fidelity, however, was sufficient for the needs of the ISR planners. GMTI could be cued to watch for activity originating from that location and then to report any incidents in which activity terminated along a known route of travel for coalition forces, in an area where coalition forces were known to be operating (such as where a school was being built), in open fields (which could be a

longer term, larger cache locations) or that highlighted breeches in the Baghdad security belt and indicated where smugglers were able to bring weapons in and out.

Locations that indicated a potential weapon emplacement (along the route or near an operating area) were handled with the same systems involved in the short term route clearance (primarily FMV and CAS assets). Locations that indicated other cache sites or smuggling routes were then used to cue other ISR assets to more precisely locate the activity. Coherent change detection could be very useful in identifying disturbed earth in a field that could represent a cache location, foot tracks leading to such areas, or vehicle tracks through the Baghdad security belt. Additional imagery assets could then be tasked to take more easily interpretable imagery of the area to provide targeting options for the BCT commander. More advanced ISR capabilities could be used to identify the specific location of IED storage or manufacture within the block of houses. Though such capabilities have extended analytical timelines that preclude their utility to support movement, they are sufficient to provide more precise "fixing" of the target location.

In the end, all intelligence information is fused in the S2 shop and then provided to the EWG. Targeting of the IED cell, cutting off its access to IEDs, and rounding up smugglers eased the problems for 2–1 AD to move to the neighborhoods that required coalition help. But it would be those COIN efforts in support of the Iraqi people that ultimately defeated the IED problem, not the targeting of the IED cells. In the end, the ISR operation met with mixed results.

Efforts to find IEDs prior to their detonation were largely of marginal effectiveness. The soldiers who spent the previous 12 months travelling over those same routes were far more effective in identifying potential IEDs, particularly those that complicated ISR use (surface laid, victim triggered, emplaced during the day). Efforts to eliminate the IED cell were more effective but again resulted in only temporary respites from IED attacks while the soldiers of 2–1AD accomplished their COIN tasks. Despite the effectiveness of ISR sensors and capabilities (or lack thereof) the biggest learning curve turned out to be the coordination of the information. Getting the right cues to the other sensors, ensuring the right personnel were in the loop, all proved to be vital to the success of the mission. Misspelled names in e-mail lists, phones that were unable to

communicate with outside agencies, and simply the scheduling of duty shifts all impacted the flow of information adversely. Again, these are areas of particular concern that need to be addressed during ISR planning.

3. Integration of Joint Planning

Integration between CFACC ISR planning, tasking, and execution elements can only be improved through the development of habitual relationships. The assignment of ISRLOs to the Division level was an important first step but their presence is required at the level of planning which demands delegation down to the BCT level. Formalizing and establishing re-current interactions with reach back organizations via the DART also improved coordination during planning. By therefore developing a shared understanding of the problems encountered, assets and personnel could be better managed to meet the unique needs of each of the land owning commanders.

Having examined the importance of CFACC representation at the level of ISR planning and integration, Chapter IV provides recommendations for the necessary changes to the tasking of ISR capabilities. Ultimately, planning is merely a frustrating exercise when it is not supported by a tasking process that supplies the assets necessary to execute the plan.

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IV. REQUESTING ISR—COLLABORATIVE ENVIRONMENTS

A. INTRODUCTION

Chapter III addressed the problems of Army re-organization discussed in Chapter I and the need to approach Counterinsurgency (COIN) Intelligence, Surveillance, and Reconnaissance (ISR) as a "wicked problem" based on the criteria provided in Chapter II. The deployment of ISR liaison officers (ISRLOs) into Army planning teams and the conduct of more detailed planning will require a tasking process that meets the needs of the supported commander. This chapter details the tasking process, the changes that are required, and makes recommendations for improving that process.

Improving the Combined Forces Air Component Command (CFACC) ISR support to a COIN campaign will require not just an influx of additional ISR assets but a means by which to improve the utilization of those assets. This process must integrate not only organic assets of the supported unit and the CFACC, but must also leverage both ISR and non-traditional ISR assets that may prove useful substitutes. By continuing to focus on the shared understanding developed during mission planning, a carefully integrated process can appropriately prioritize units or missions versus "servicing" problem sets that may not be applicable. Finally, understanding throughout the chain-of-command enables decisions to be made at much lower, decentralized command nodes thus reacting more effectively to developing recognition of wicked problems.

B. MORE ISR, MORE PROBLEMS?

In the six years since the start of Operation IRAQI FREEDOM (OIF), the CFACC increased the number of unmanned aerial vehicle (UAV) patrols by seven-fold,[266] U-2

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[266] Tom Vanden Brook, "Drones' Supply Short of Demand," *USA Today*, March 28, 2007, http://www.usatoday.com/news/washington/2007-03-28-drones-supply_N.htm, (accessed July 24, 2009).

missions by 30%,[267] doubled the number of Joint Surveillance and Target Attack Radar System (JSTARS) and RC-135 aircrew in theater,[268] and increased the number of targets to be collected by other ISR platforms. Additionally, the ISR Division (ISRD) of the Combined Air and Space Operations Center (CAOC, the senior command and control node of the CFACC) has developed new processes that allow for more direct interaction of ISR platforms with supported ground units. These improvements include the deployment of ISR Liaison Officers and the assignment of "direct support" missions in which an ISR asset flies under the direct guidance of the supported unit rather than on a pre-determined collection mission with a set of specific targets. Lastly, working with the collection management team at the Multi-National Forces Iraq headquarters, the CFACC has employed a strategy of directly assigning specific UAVs to each Division, increasing their responsiveness and allowing for more detailed pre-planning of missions.

While these improvements have increased the reliability of CFACC ISR assets being available to the ground units and have significantly improved the ground commander's trust in the CFACC, they have not had a significant impact on the effectiveness of ISR. In reviewing the number of improvised explosive devices (IEDs) detected by CFACC ISR in the course of OIF, the commander of the U.S. Air Force's Air Combat Command described the employment of CFACC assets as "a waste."[269] Consistently, the CFACC, despite the increased number of available ISR assets in theater, is unable to meet the insatiable demand for ISR as reflected by the collection requests submitted by the land component command (LCC). The problem does not lie in the number of ISR assets available or in the capabilities (or lack thereof) with regards to finding IEDs or other targets in the COIN fight. Instead, the problem stems from the fact that the ISR problems that are challenging both land and air planners are wicked

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[267] David A. Deptula, "Air Force Intelligence, Surveillance, and Reconnaissance Programs," (presentation to the House Armed Services Committee, subcommittee on air and land forces, April 19, 2007), http://www.globalsecurity.org/intell/library/congress/2007_hr/070419-deptula.pdf, (accessed July 24, 2009.)

[268] Wes Ticer, "Wing Airmen Tackle Increased Ops Tempo," *Desert Eagle, Vol 7* (13), http://www.379aew.afcent.af.mil/shared/media/document/AFD-071012-056.pdf, (accessed July 24, 2009).

[269] Fabey, "UAVs, Other Aircraft Being Misused," para 1.

problems, problems for which such planners have little experience and ones that can only be resolved through a shared understanding of the problem and a commitment to its resolution.[270]

C. WICKED SOLUTIONS REQUIRE BETTER INTEGRATION

As discussed in Chapter III, solutions to wicked problems require organizing teams of stakeholders in such a manner that they can develop a shared understanding of the problem and can commit to the proposed solution. The intent is not to replace the bureaucracies of the military establishment as such organizational structures allow for economy of force and unity of effort which have permitted the U.S. military and its coalition partners to dominate all foreign militaries. Rather, networks as an organizational form will provide the optimal capability for managing people and ideas that are incompatible with the hierarchies of the bureaucracy.[271] Establishing these networks of stakeholders must be done both formally and informally to ensure success. Currently, such networks already exist to some extent at most levels of the military bureaucracy but they often lack the full participation of the stakeholders. To develop a shared understanding of the ISR problem, both customers and collectors must be a part of the network. The focus of the network will differ at each echelon but the requirement for integration does not lessen.

The collection management (CM) process is the formal structure through which stakeholders manage "high demand, low density" assets. Despite concerns for overemphasizing "efficiency" over "effectiveness,"[272] an effective CM process allows the Joint Forces Commander to provide limited assets to priority operations and units while maintaining pressure on insurgent networks and supporting non-kinetic counterinsurgency operations throughout the theater. To do so, however, requires the cultivation of a shared understanding and collaboration in solving COIN associated ISR problems through better integration of the overall CM process.

[270]Conklin, "Wicked Problems and Social Complexity," 1.

[271] Anklam, *Network,* xv.

[272] Flynn, Juergens, and Cantrell, "Employing ISR," 59.

D. JFC ROLE IN ISR PRIORITIZATION

The Joint Forces Commander (JFC) drives the collection management process by providing a vision for campaign success. The CM process strives to realize the JFC's vision by balancing the effectiveness of limited collection resources within operationally constrained timelines against the insatiable ISR requirements of operational commanders. This is a process that occurs at all levels and works to convert intelligence/information requirements into validated collection requirements. The process also includes the tasking or coordinating of actions with appropriate collection agencies.[273]

1. Allocation vs. Apportionment

Currently, the terms "allocation" and "apportionment" are misused in the Iraqi theater of operations. The collection management team at the Corps level developed the terminology to explain how it "allocated" and "apportioned" limited numbers of ISR assets/sorties/collection targets. By the Corps CM team definition, allocating an asset is to take a Corps ISR asset and fill an emerging high priority requirement. Units that receive allocated assets do so only for a limited amount of time and with the understanding that the asset could be pulled to fulfill a higher priority tasking. Apportioned assets on the other hand, as the Corps CM defined it, are tasked to the Divisions themselves for use on a regular basis. This allows the Division to then fill requirements submitted by subordinate BCTs with more confidence in the asset's availability. While the Division may choose to re-task the asset to another BCT, the ability to request Corps apportioned assets often eliminates this requirement and nearly guarantees a BCT that Division-level apportioned assets can be counted on to be available as requested.[274] For the purposes of this paper, those assets that are reserved for filling an emerging high priority requirement will be referred to as "non-aligned ISR." Assets that are tasked specifically to a unit on a regular basis will be referred to as "aligned ISR."

[273] JP 2–01, III-11

[274] Odierno, Brooks and Mastracchio, 53.

Doctrinally, the term “apportionment,” specifically as it relates to air power, refers to “the determination and assignment of the total expected effort by percentage and/or by priority that should be devoted to the various…operations for a given period of time.”[275] “Allocation” is the translation of this apportionment decision into the number of limited assets and resources to be distributed for employment among competing requirements. For air power, this is typically calculated as the number of specific sorties by type of aircraft to be made available for a particular operation or task.[276] For ISR, however, this may be better envisioned as the number of collection opportunities (measured in terms of images, time, or other appropriate metric) made available for a particular unit or tasking.

According to doctrine, “the Joint Forces Commander (JFC) apportions the ISR effort based on campaign objectives.” Traditionally, this is managed by a set of commander’s critical information requirements that establish the priority of information based on the commander’s overall view of the campaign.[277] In a counterinsurgency operation, however, the JFC will have less appreciation for the information requirements necessary for defeating the insurgency in any one location. By designating the Brigade Combat Team (BCT) commander as the responsible authority for defeating the insurgency in that area of operations, the JFC has effectively delegated his authority to establish critical information requirements to the BCT commander in each area of operations (AO). The JFC still retains the authority and responsibility for determining how ISR Operations will support the accomplishment of his overall campaign plan by providing apportionment guidance for the use of ISR assets in theater.[278] While this has typically been an issue of designating which targets or which information requirements are of highest priority, the JFC is, in fact, free to apportion ISR efforts by unit, much as is

[275] Joint Publication 1–02, *Department of Defense Dictionary of Military and Associated Terms,* October 2007, 41.

[276] JP 1–02, 31.

[277] JP 1–02, III-9.

[278] *Theater ISR CONOPS,* 6

done with Close Air Support (CAS) operations. In such a fashion, the JFC may designate a particular brigade, division, or area of operations as his main effort and assign a percentage of ISR support to that effort.

2. Collection Management Authority

The combatant commander exercises collection management authority (CMA) through two interrelated functions. The first, Collection Requirements Management (CRM), identifies what information is necessary for collection in order to support the commander's operations. The second, Collection Operations Management (COM), evaluates what systems are best suited for collecting against a specific target in order to fulfill the collection request. (See Figure 31, Interaction Between CRM and COM Authorities.) While the combatant commander will normally retain CRM, COM is usually delegated to the component commander who is designated the supported commander for theater ISR.[279] A different COM may be required for each collection medium to best ensure unity of effort in the execution of ISR operations. The designated COM for each medium, therefore, should be that functional component with the preponderance of ISR capabilities in that medium *and* the ability to plan, task, and control joint ISR operations throughout the theater.[280] This will typically be the CFACC with regards to airborne ISR capabilities. There should be constant dialogue between the CRM and the COM to ensure requirements are in fact being satisfied by collection operations.[281]

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[279] AFDD 2–9, 14–15.

[280] *Theater ISR CONOPS,* 2.

[281] JP 2–01, III-12.

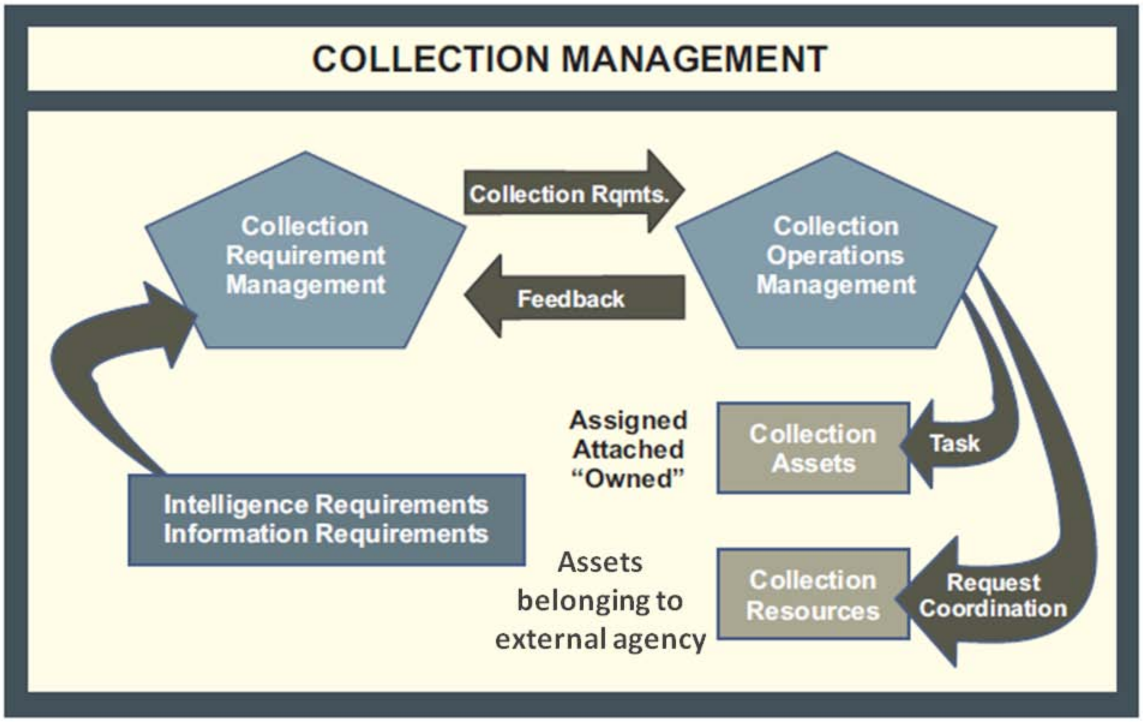

Figure 31. Interaction Between CRM and COM Authorities[282]

As ISR operations have become more distributed and the Army and Marine Corps have begun to develop their own ISR assets, however, COM has become more fractured over time. Though Joint doctrine suggests that all theater ISR assets, to include those assets organic to the U.S. Army and Marine Corps, should be allocated under the CFACC for tactical control (TACON), current operations have allowed the Army and Marines to retain control over their own assets.[283] In that fashion, there is separate COM for those assets, usually at their highest echelons, with the CFACC focused on COM for all other air and space borne ISR platforms.

[282] From: JP 2–01, III-13.

[283] Cheater, "The War Over Warrior," 17.

E. COLLECTION REQUIREMENTS MANAGEMENT AND THE CORPS COLLECTION MANAGER

Understanding how to effectively distribute ISR assets requires a thorough understanding of the commander's priorities, the developing battlespace, and the needs of subordinate commanders. In the Iraqi theater of operations, CRM is the responsibility of a combined staff of the Multi-National Corps Iraq and Multi-National Force Iraq collections management personnel, working to achieve the balance required for meeting higher, adjacent, and lower headquarters requirements.[284]

The CRM has the responsibility of modifying the JFC's prioritization of effort by monitoring the progression of the campaign. In a conventional conflict, this would require changing the priority of intelligence problem sets or adding problem sets to the list of priorities. With each BCT commander dealing with his own unique set of problems, with varying degrees of success in each, the CRM is less concerned about the specific problems than with each BCT's success as a whole. Understanding that a counterinsurgency campaign must carefully balance the successes in each area of operations in order to prevent insurgents from simply shifting from one AO to the next, the CM team at the Corps must ensure that the weight of effort given to each BCT maintains the constant pressure on the insurgent in all areas while allowing the BCT commanders to acquire the information necessary for their own efforts.[285]

Although Baghdad may represent the highest priority for the JFC's campaign plan, in order to provide a stable environment for the Government of Iraq to work and to influence information operations that are focused on the capitol area, all ISR efforts cannot simply be focused on Baghdad alone. In such a case, insurgent operations would simply move to a different location and continue to function there instead. Rather, the Corps must balance efforts to suppress the insurgency in Baghdad while simultaneously preventing its spread into other areas. In this fashion, it becomes necessary for the

[284] Odierno Brooks, and Mastracchio, "ISR Evolution," 54.

[285] Former MNC/F-I Collection Manager, e-mail message to author, April 11, 2009.

Corps CM team to regularly modify the apportionment of ISR efforts among the various areas of operation, staying abreast of the needs of the local commanders to maintain control of their AOs.

1. Requirements Receipt and Prioritization

In a conventional fight, the importance of intelligence requirements cannot be over-estimated with regards to focusing ISR efforts on the most critical information needs of the commander. Due to the demand for ISR and its limited availability,[286] prioritization helps to alleviate efforts to over task, mis-task, or excessively use ISR assets for lesser functions. In turn, ISR effectiveness can be evaluated by tying essential element of information (EEI) answers back to specific priorities.[287] Complications arise, however, with regards to the establishment of those priorities.

When evaluating the validity of a collection request, collection managers will often use a number of criteria to include impact on the commander's concept of operation, the availability of the necessary information within archived data, or the potential for other validated requests to fulfill this need as well. Only when it is determined that the collection requirement does support the commander's concept of operations, cannot already be answered, and has not already been tasked in another format will the request continue through the collection management process.[288]

Of these criteria, however, the most important is whether the request adheres to the commander's concept of operations. How this is determined can greatly impact the collection management process as certain criteria are more appropriate to a counter insurgency effort than others.

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[286] JP 2–01, III-10.

[287] Air Force Doctrine Document 2–9, *Intelligence, Surveillance, and Reconnaissance Operations,* July 17, 2007, 11.

[288] AFDD 2–9.

a. The Joint Collection Management Board

A Joint Collection Management Board (JCMB) is typically formed at the JFC's discretion to serve as a joint forum for managing collection requirements and coordinating collection operations.[289] Each component develops its own collection target nominations list which it prioritizes based upon that component's specific needs. The components then forward their prioritized lists to the JCMB which validates all of the targets, combines them into a single integrated list and then prioritizes all of the targets against the JFC's campaign objectives. The JCMB then releases a Joint Integrated Prioritized Collection List (JIPCL) and provides apportionment recommendations for ISR assets to fulfill those requirements.[290]

b. Target-centric vs. Unit-centric Prioritization

As practiced traditionally, and further formalized in the U.S. Air Force's *Theater ISR CONOPS*, priorities are assigned to specific targets or target sets. Such target sets are identified during the Joint Intelligence Preparation of the Operating Environment (JIPOE) when several categories of adversary capabilities and/or targets systems are identified.[291] This concept is extremely well-suited to a machine bureaucracy dealing with a stable and simple environment. In this fashion, it is possible for centralized planners to clearly delineate the theater-wide intelligence problems with which to be dealt and to then prioritize collection against those specific targets. Although it is acknowledged that such target sets may change or additional ones may be added during the course of the conflict, this concept ignores the highly unstable and complex nature of a counterinsurgency environment in which a machine bureaucracy must be replaced by a highly decentralized network of adhocracies in order to operate effectively. The *Theater ISR CONOPS* explains, "the more dynamic the operating, the less

[289] JP 2–01, III-16.

[290] JP 2–01, III-16.

[291] *Theater ISR CONOPS*, 6.

mechanical and more fluid ISR processes should be…which means human judgment and leadership must prevail over strict adherence to a mechanical process."[292]

For example, an ISR request that supports the capture of a high value individual associated with Al Qaeda ranks higher than an ISR request that supports looking for improvised explosive devices. Unfortunately, as has been noted previously, not every BCT commander is dealing with the same problem sets. A BCT commander operating in south-eastern Iraq in vicinity of Basra is unlikely to be making many (if any) collection requests for Al Qaeda targets. Therefore, all of his collection requests will automatically be lower than those of other units that are dealing with a local Al Qaeda problem.

Using such a strategy for prioritizing collection requests can lead to subordinate units attempting to "game the system"[293] by modifying the collection requirements to match the JFC priority targets. A BCT collection manager may claim to want ISR to search for insurgents with direct ties to Al Qaeda, when in fact, they are simply oil smugglers who are reducing Government of Iraq (GOI) capability and providing monetary support to the local Shi'a insurgents. In Iraq in 2007, many collection managers used liberal interpretations of collection prioritization to justify taskings, usually associating any collection request with improvised explosive devices. (The same often occurred with regards to CAS requests.)

By 2008, the Joint Forces Commander acknowledged that each BCT was dealing with a unique set of obstacles to defeating the insurgency within their area of operations and restoring government capacity in that region. Rather than designate a specific target as a priority to be used across the board, whether it impacted the BCT commanders or not, the JFC instead prioritized which BCTs or operations should receive priority in support.[294] This allows BCT commanders to tackle their local problems as necessary to meet the JFC's overall objective which is the quelling of the insurgency and

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[292] *Theater ISR CONOPS,* 30.

[293] *Theater ISR CONOPS,* 23.

[294] MNC/F-I Collection Manager, e-mail message to author, April 28, 2009.

the restoration of state services. As the fight becomes less intense in one area or more critical in another, the JFC can shift his priority of effort among those units rather than attempt to identify every potential ISR problem set they might encounter. (See Figure 32, ISR Prioritization Options.)

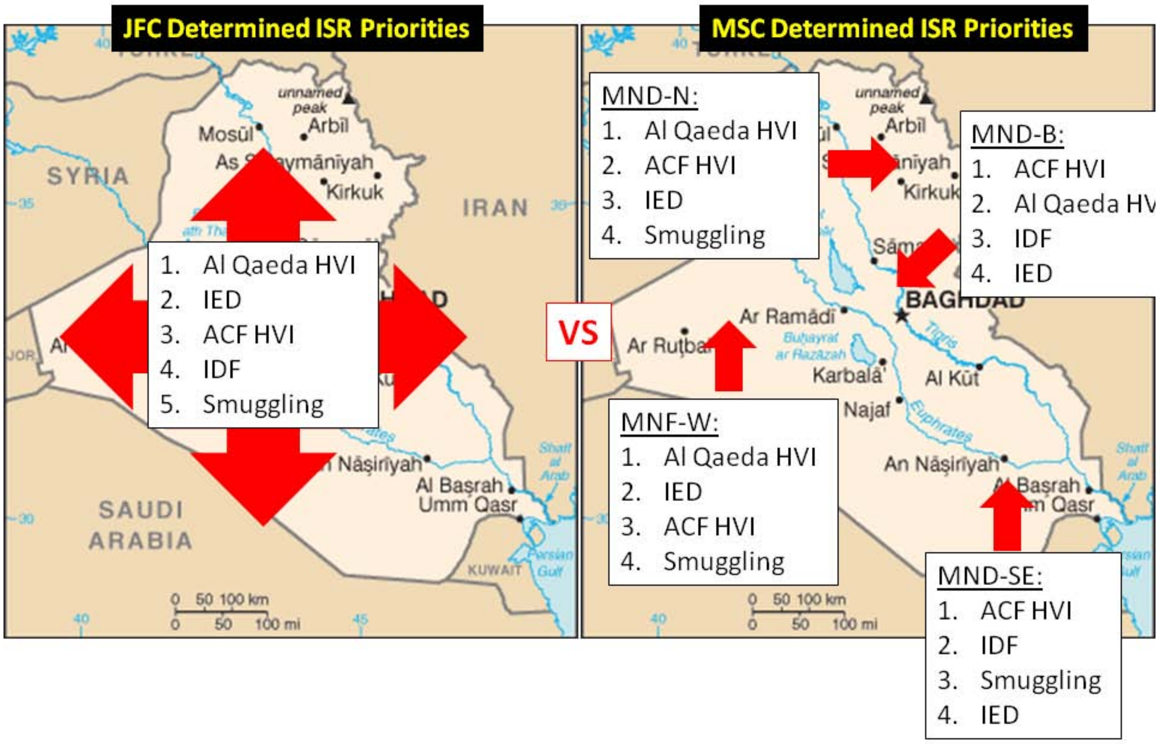

Figure 32. ISR Prioritization Options

In the spring of 2008, when Iraqi forces began to engage anti-government insurgent groups in the Basra region, the priority of ISR "targets" did not change. The fighting was focused on Shi'ite insurgent groups not Al Qaeda forces. The success of the Iraqi government forces was critical to the overall success of the counterinsurgency campaign. Not only would it defeat a key opponent of the GOI, but it would demonstrate the capability of Iraqi forces to conduct major operations on their own (with coalition support) and therefore, should rightly have become a focus of ISR collection efforts. Without a specific target set including Al Qaeda high value individuals (HVIs), IEDs, or

indirect fire, the priority of their targets did not formally match that established within the collection management community. Instead, by designating the Basra operation itself as a priority in reference to other units or operations, collection requests were more accurately prioritized to support the COIN campaign.

2. Collection Planning

a. Effects Synchronization at the CRM-Level

At present, effects synchronization is not conducted at the CRM-level. Rather, planning for ISR missions is conducted at the BCT level and modified/clarified at the Division level. Corps CM team members evaluate each collection request individually, ensuring that it matches the JFC's intent for operations. If there is no clear tie between the collection requirement and the JFC's vision for success (as illustrated through the prioritization of units/operations), the collection requirement is returned to the originator to be modified to meet JFC requirements or to be satisfied via the requestor's organic ISR capabilities.

As collection management is largely conducted through a "stove piped" process, the requirements for integrated ISR or deliberate cross-cuing are not often taken into consideration. Rather, a validated collection requirement is filled based on priority and available resources. The fact that the asset is essential to an operation or requires cross-cue by another asset or is used to cross-cue another asset is not factored into the decision making. This can result in an ISR asset being approved for use without the required cross-cue platform also being approved because it is being handled by a different CM. This in turn results in a wasted asset as without the planned for cross-cue, the received asset is of little utility.

b. ISR Asset Alignment for Planning Purposes

Until the summer of 2007, ISR assets were centrally managed by the CRM and COM functions. Units would submit requests for ISR support, typically two to three days in advance, and the CM process would parse the requests, prioritize them based on the JFC dictated priorities and then assign ISR assets to collect on the specific targets

identified by each unit. The complicated nature of balancing limited assets against a significant collection deck often left units unaware of their ISR support until 6 to 12 hours prior to the desired date of support. In many cases, this prevented requesting units from developing detailed plans with expected ISR asset and relying extensively on organic assets, despite their much more limited capabilities, in order to guarantee availability.

As the most requested ISR capability, FMV assets provided the most visible evidence of this process's failings. Supported units often found that their targets changed in the time from requesting support to when the asset arrived on station but they had no ability to change the asset's targets. Attempts to do so required drawn out *ad hoc* requests that resulted in a re-evaluation of centrally dictated priorities and the needs of other units. Assets that had been assigned to support one unit could suddenly be pulled away to support another unit with little to no warning because higher priority taskings could pop-up with little notice. When planning had required such assets to be available, the mission often had to be aborted due to the absence of the FMV asset.

In other cases, it was difficult if not impossible to specify target locations or required timelines beyond a block of several hours.[295] Waiting for a high value target to be detected by HUMINT or SIGINT could result in an FMV asset "burning holes in the sky" aimlessly or tasked to collect on a much lower priority target. When this occurred, higher headquarters would often pull the asset and assign it to another unit only to learn later that the HVI had been detected but since the FMV asset had been transferred the tasking unit could not pursue their HVI.

Finally, in June 2007, the deputy collection manager for MNC-I and the chief of FMV collections developed a plan for dividing FMV assets up amongst the various Major Subordinate Commands (MSC).[296] Maligned as "peanut butter spreading" ISR assets, it was feared that doing so would disrupt the concepts of "unity of command" and "economy of force" necessary to shift assets when and where necessary to meet the

[295] JP 3–24, VII-5.

[296] Former MND-N ISRLO, e-mail to author, October 27, 2009.

greatest needs. In reality, this process gave more FMV assets and better capable assets to those units designated as priority efforts by the JFC which in turn allowed commanders better predictability in asset availability. This "apportionment and allocation" of FMV assets significantly improved LCC trust of ACC assets.[297] (See Figure 33, ISR "Bucket" vs. ISR "Peanut Butter Spread" Approaches to FMV Asset Management.)

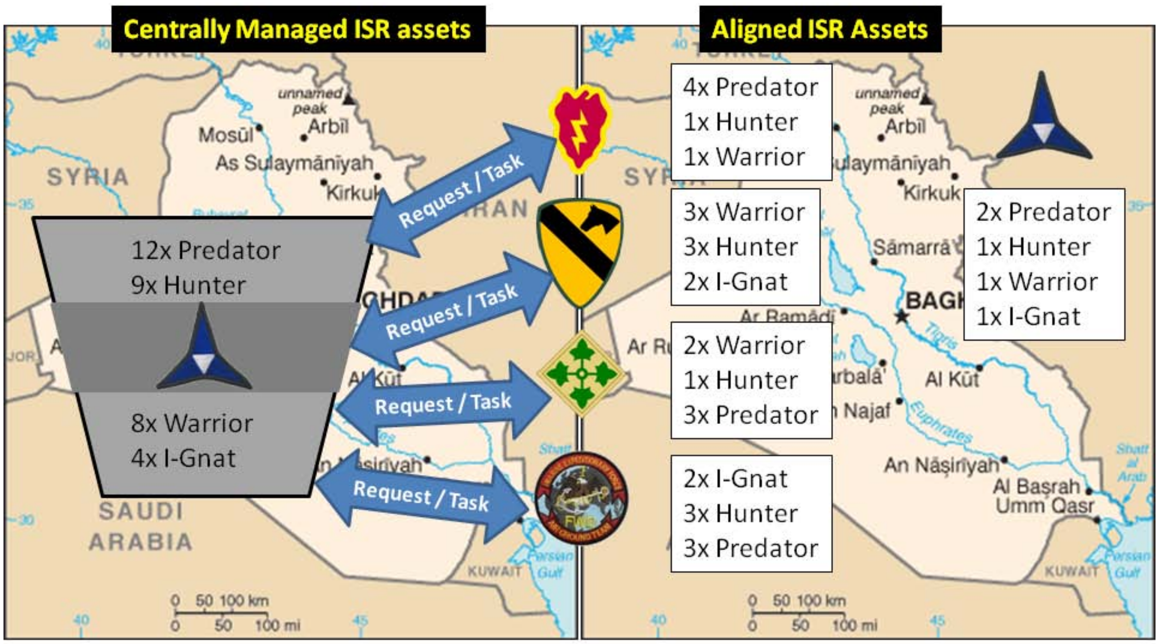

Figure 33. ISR "Bucket" vs. ISR "Peanut Butter Spread" Approaches to FMV Asset Management

(1) Requesting assets vs. effects. Subordinate collection managers are directed to request an ISR "effect" rather than a particular ISR asset. This, however, generally ignores the associated systems capabilities that may make an ISR asset more appropriate to a unit's needs. For example, some ISR assets have different connectivity capabilities than others to include voice communications that may be necessary to support ground personnel in the field, or the ability to directly downlink information to organic analytic personnel. At present, collection managers are simply directed to

[297] Odierno Brooks, and Mastracchio, "ISR Evolution," 55.

include all of these considerations into their requests but then are chastised when their requests become so specific as to indicate a specific asset.

While it is valid to discourage CMs from requesting a specific asset and to allow CMs at higher echelons to align assets based on availability and ability to satisfy the request, genuine requirements for specific assets should be permitted when properly justified. Furthermore, subordinate planners are likely to have a better understanding of the decisions to be made by their commanders and thus, what assets will or will not be of value to their operations. In the summer of 2007, when the Corps CM began to align FMV capabilities with units, the MQ-1 Predator was originally aligned with Multi-National Division-Baghdad (MND-B). The collections team for MND-B, however, recognized that this was an ineffectual pairing as the MND-B commander had demonstrated reluctance in employing UAV launched weapons into his urban battlespace. For this reason, the MND-B CM team requested that the Corps swap the MQ-1 for the Warrior Alpha which largely had the same capabilities with the exception of the ability to carry Hellfire missiles. Within days of providing the Predator to MND-North (MND-N), it was authorized to employ Hellfire missiles against insurgents planting an IED. The Warrior Alpha, meanwhile, was effectively used by MND-B to meet their collection requirements. In the end, subordinate ISR planners must be trusted to understand their requirements and not confined by strict adherence to rules or standard operating procedures.

(2) Tactical Control vs. Direct Support. A solution the collection managers at the CAOC ISRD developed and coordinated with the Division ISR Liaison Officers (ISRLOs) was the development of "direct support" ISR missions, particularly in the usage of the Global Hawk but later extended, in a limited fashion, to fighters employing reconnaissance pods. (See Figure 34, F-16 with Tactical Reconnaissance [TACRECCE] Pod on Center-line Mount [Circled in Red].) During "direct support" missions, the ISR asset is tasked to work directly with a particular unit. The supported Army unit would action a target, for example, and as insurgents fled the scene the Army would provide the latest information available. The ISRLO, working in conjunction with the JSTARS, the Warrior Alpha, and the Global Hawk (GH) would then coordinate the

tracking and locating of the insurgents as they sought cover. The JSTARS would provide updates to the Army ISR Operations officer directing the Warrior Alpha and to the ISRLO who was in contact with the GH. Each would then provide feedback on what they found or did not find, and the search would continue with information fed to the Army unit for capturing the insurgents.

Figure 34. F-16 with Tactical Reconnaissance (TACRECCE) Pod on Center-line Mount (Circled in Red)[298]

The ability to re-task the GH, vice providing it a list of targets to be imaged prior to mission launch was a significant improvement in the responsiveness of ISR. Commanders were no longer forced to develop exact target locations and descriptions 72 hours in advance of when they required ISR support. Recognizing that ISR must now be integrated with operations to provide real-time, *dynamic* support to

[298] After: http://www.f16.net

missions underway, the DS mission allowed supported commanders to change, drop, or add targets as necessary to effectively develop their missions.

An important concept to understand with the use of direct support missions, however, was the fact that Tactical Control (TACON) was not transferred from the CFACC to the CFLCC.[299] Designating an asset as being in a "direct support" role indicates that the asset is authorized to directly answer the supported force's request for assistance. Alternately, TACON involves the command authority over an assigned asset that includes the detailed direction and control of movements or maneuvers to accomplish missions.[300] The Global Hawk, or fighters, still operated based on the tasking of the CFACC and could not be transferred to other units without the express consent of the CFACC. Direct support missions allowed ISR units to coordinate and communicate directly with a designated point of contact within the supported unit.[301] While the supported unit was expected to provide new targets and/or intent for the operation, they were discouraged from providing specific directions for ISR employment, attempting to "steer" the sensor, which would lead to unnecessary delays and less effective employment of the asset.[302] There are cases, however, in which the supported unit, through a JTAC, ISRLO, or similar point of contact (POC), is able to more efficiently guide sensors to a new target because of their greater situational awareness than would be possible simply through providing exact coordinates.[303]

Similarly, the alignment of specific full-motion video (FMV) assets with particular Divisions replicated this Direct Support vs. TACON concept. (See Table 5, Commanding and Supporting Relationships and their Responsibilities.) The FMV asset was able to answer directly to the needs of the Division to which it was aligned, changing targets or working with different subordinate units as the Division directed. Each of the aligned FMV assets, however, was scheduled to fly at specific

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299 *Theater ISR CONOPS,* 17.

300 Cheater, "The War Over Warrior," 31.

301 *Theater ISR CONOPS,* 21.

302 Ibid., 22.

303 Cheater, "The War Over Warrior," 31.

times of the day. Should the Division need an asset available at a different time or an asset with different capabilities (such as an armed Predator to prosecute targets immediately after confirmation), the Divisions would have to coordinate with one another and with the Corps in order to trade FMV assets. Divisions did not have the ability to change the load out of the FMV that was aligned with them nor were they able to change their schedule (options that would have been possible with TACON authority).

Table 5. Commanding and Supporting Relationships and their Responsibilities[304]

If Relationship Is:		Inherent Responsibilities Are:				
		Has Command Relationship with:	May Be Task Organized By:	Receives Adminstrative / Logistic Support:	Assigned Position / Area of Operation by:	Has Priorities Established By:
Command	Attached	Gaining Unit	Gaining Unit	Gaining Unit	Gaining Unit	Gaining Unit
	OPCON	Gaining Unit	Parent unit and gaining unit; gaining unit may pass OPCON to lower headquarters	Parent unit	Gaining Unit	Gaining Unit
	TACON	Gaining Unit	Parent unit	Parent unit	Gaining Unit	Gaining Unit
	Assigned	Parent unit	Parent unit	Parent unit	Gaining Unit	Parent unit
Support	Direct Support (DS)	Parent unit	Parent unit	Parent Unit	Supported unit	Supported unit
	Reinforcing (R)	Parent unit	Parent unit	Parent unit	Reinforced unit	Reinforced unit then parent unit
	General Support Reinforcing (GSR)	Parent unit	Parent unit	Parent unit	Parent unit	Parent unit then reinforced unit
	General Support (GS)	Parent unit	Parent unit	Parent Unit	Parent unit	Parent unit

F. COLLECTION OPERATIONS MANAGEMENT AND THE CAOC

The COM organizes, directs, and monitors the assets, agencies, and personnel that collect the information necessary to satisfy the validated collection requirements.[305] In

[304] FM 2–0, 3-9.

the current contingency operations, the CFACC executes COM for operations in Iraq, Afghanistan, and the Horn of Africa.[306] The CFACC tasks all airborne and space borne ISR assets for which he has TACON or OPCON via the air tasking order (ATO). The ATO generally directs times, locations and targets for assets while the reconnaissance, surveillance, and target acquisition (RSTA) annex to the ATO provides specific collection taskings. The RSTA and the ISR strategy that guide it are developed during the Joint Air Operations Planning process by ISR managers working at the CAOC in the ISRD.[307]

As the COM, the CFACC executes the final authority with regards to balancing the benefits of successful collection versus the risk involved to the ISR assets and supporting units. Such risks may include threats to the assets themselves (such as surface to air missiles) or synchronization factors such as insuring an ISR unit has sufficient time to accomplish a mission before its next tasking. Additionally, the CFACC (via his ISR planners) establishes the parameters under which dynamic re-tasking can occur as part of the ISR strategy. Such guidance is included in the RSTA to ensure that all ISR customers understand the limits of changing an ISR asset's track or mission.[308] Beyond such standard operating procedures, the collection operations manager should take care not to inhibit the coordination between ISR units and their supported customers which may be necessary to tailor ISR actions.[309] Dynamic ISR operations will be covered in greater detail in Chapter V.

1. Collaborative Management of Limited Resources

Mintzberg, using James Thompson's model of analyzing task interdependence, defines pooled interdependence as "the sharing of resources;" sequential interdependence as a requirement for tasks to be completed in order (that is one is finished before the next

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305 JP 2–01, III-24.

306 Cheater, "The War Over Warrior," 26.

307 AFDD 2–9, 15.

308 Ibid.

309 *Theater ISR CONOPS*, 19.

can begin); and reciprocal interdependence as the passing of work “back and forth between tasks” (1993, p. 54). (See Figure 35, Thompson's Interdependence Model.)

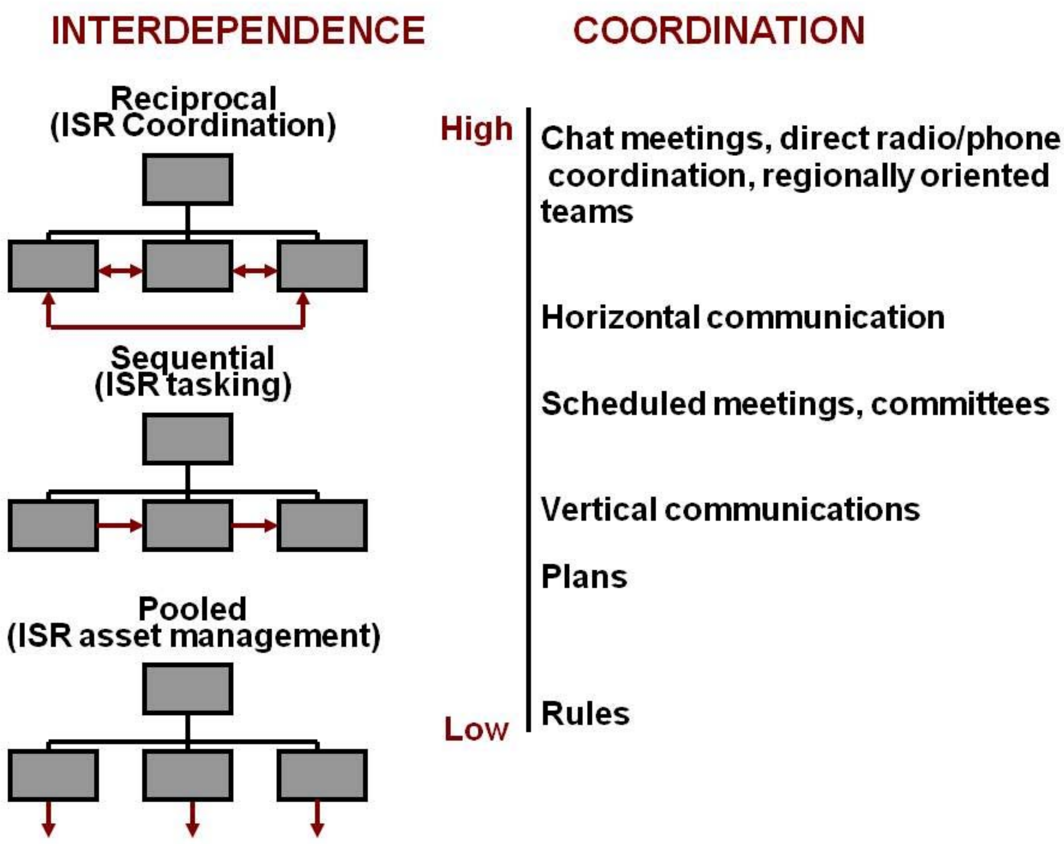

Figure 35. Thompson's Interdependence Model[310]

For USAF ISR, pooled interdependence was a fact of life. Limited ISR assets demanded that all ISRLOs worked together to make the best of the finite capabilities. This often resulted in trading assets when one recognized the need in another. Such exchanges were not uncommon and relied upon the ISRLOs and the collection managers they supported to be “honest agents.” That is, to resist the urge to “hoard” ISR assets in the fear that once they were given up they would not be available when needed.

310 After: Daft, *Essentials of Organization Theory and Design*, 2001, p. 91.

a. Sequential Request Processing

The process of requesting ISR support was very much in the vein of sequential interdependence. The S-3 had to determine what target his units would be going after and then provide this information to the S-2. When the S-2 had completed a review of the available intelligence and identified gaps in their coverage, they tasked their collection manager with requesting ISR support. This request was sequentially processed by each higher headquarters that would either fill the request with available assets or pass the request on to the next higher element in the chain-of-command. Furthermore, what we see in this transition from conventional operations to COIN operations was a move from Thompson's reciprocal model to a sequential model. As noted in the introduction, originally, the Air Force planned its missions in support of the Army in parallel with the Army's planning, providing feedback and receiving further details as they became available. When the Army pushed responsibility for planning down to the BCTs, Air Force planning activities largely became dependent on the BCTs completing their planning first. (See Figure 36, Sequential ISR Tasking Process.)

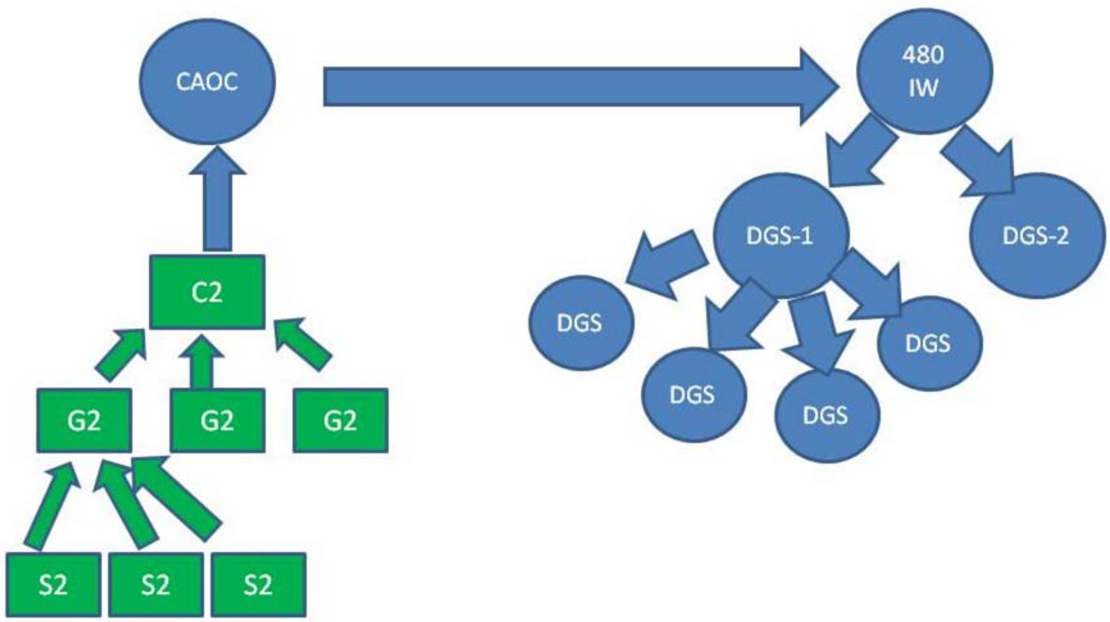

Figure 36. Sequential ISR Tasking Process

b. Reciprocal Request Processing

With the addition of the ISRLOs and the geographically oriented Distributed Ground Station (DGS) and DGS Analysis and Reporting Teams (DARTs), this has begun to transition back to a reciprocal model as the ISRLOs and Brigade S2s are able to begin coordination with the CAOC and supporting ISR units even before the BCT plans are completed. (See Figure 37, Reciprocal ISR Coordination Process.) While the sequential form of tasking is conducted through "stove pipe" type communications means (most notably PRISM and e-mail), reciprocal coordination is conducted through chat. Although e-mail allows senders to communicate with multiple recipients, this form of communication lends itself only to reply and response.[311] Chat allows real time interaction between multiple nodes simultaneously so that discussions can be carried out, problems and solutions can be derived, and decisions (when authorized) can be agreed upon by the community as a whole versus directed downward from a hierarchal structure.

[311] Conklin, "The Age of Design," 19.

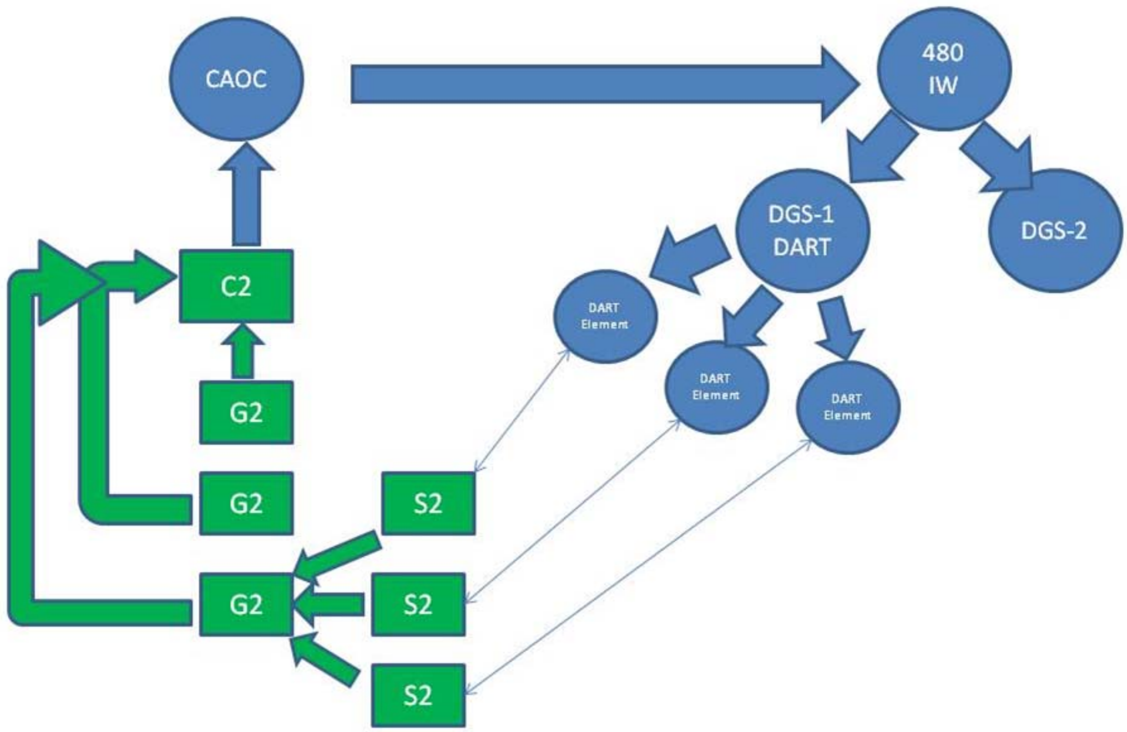

Figure 37. Reciprocal ISR Coordination Process

2. Collection Mission Planning

When dealing with a conventional conflict, the collection management team at the CAOC takes the JIPCL and simply begins to task assets against the highest priority targets within each list. As explained in this chapter, however, such prioritization is incompatible with the unstable, complex nature of a counterinsurgency campaign. In order to deal with the different problems encountered by BCT commanders in each AO, prioritization will be based upon the weight of effort assigned to each BCT and their operations. This will likely lead to different priorities of targets for each BCT and a requirement for the CAOC CM to constantly juggle collection requirements among assets to ensure that the greatest number of targets can be collected while still integrating those assets with the supported BCT's operations.

Such a management of ISR assets becomes significantly more difficult than simply matching priority targets against collection assets. Unfortunately, the level of

difficulty experienced by collection managers is not a factor in determining the appropriateness of COM planning. Rather, CMs must be able to match asset capabilities not only with target requirements but with operational integration requirements. Furthermore, using the traditional, target-centric approach to prioritizing collection requirements allowed for greater predictability in the number of collection opportunities each asset would have in the course of its mission. By focusing more on integration of the asset and support to prioritized units, the CM will need to adjust targets again and again to ensure that the greatest numbers of targets are being serviced in order to match the weight of effort assigned to each unit.

The small geographic area encompassed by the BCTs operating in the Baghdad area will likely allow for a greater number of collection opportunities for each BCT. The manner in which BCTs are spread out over large areas in Multi-National Division North, however, will limit the number of collection opportunities each BCT will be able to receive. Should MND-N be prioritized higher than MND-B because of a particular operation, CMs will need to provide an asset for longer periods of time to ensure that it collects a number of targets commensurate with the higher priority. With no fixed number of targets possible per collection asset, this will require modifying decks repeatedly to meet the needs of the supported units.

The COM conducts ISR planning by identifying the appropriate assets and resources necessary to satisfy a particular collection request. The asset and its supporting analysts and links are then scheduled and coordinated via the ATO and the RSTA annex. During execution of the ISR plan, the COM will also monitor the completion of ISR taskings, controlling the ISR plan through the addition of *ad hoc* requests, adjustments to the schedule, and the launch of additional resources as necessary. Such changes may become necessary based upon shifts in operations, changes in weather, maintenance or logistics problems, or communications issues. While all of these factors must be considered in developing the ISR plan, flexibility in dealing with unexpected developments is essential to successful ISR employment.[312]

[312] JP 2–01, III-25.

During ISR mission planning, planners will consider all of the available ISR assets available for planning purposes. Beyond the capabilities or limitations of the asset, however, planners must also consider the systems, agencies, and personnel involved in the processing, exploitation, and dissemination of the gathered intelligence.[313] For example, in the debate raging over providing additional FMV capable assets into theater, the number of assets alone is not the driving factor. Rather, it is a combination of the limited available airspace over certain parts of Iraq and, more importantly, the limited amount of bandwidth/frequencies with which to control the FMV assets and to downlink the video feed.[314] Pushing more FMV assets into the air will simply saturate the airspace and the number of available frequencies, leading to mid-air collisions and "electronic fratricide" as unintentional jamming occurs between assets. Additionally, it is possible for collectors to produce more data than can be reasonably analyzed if the exploitation piece of the process is not properly managed. Dealing with this aspect of ISR planning falls to the Processing, Exploitation, and Dissemination (PED) management cell.[315]

Furthermore, planners will need to consider operational factors related to the "health" of the ISR fleet to include aircraft maintenance requirements, crew availability (to include both the crew of the asset itself and those analysts exploiting the information), and crew duty day length. Combined with weather factors and the time of day that may limit when an aircraft can be launched or when its sensors can effectively collect information, these can all have significant impacts on which ISR assets are employed and whether they can actually achieve their objectives.[316]

a. Massing ISR for Effects

While ISR planners will certainly plan for unit requirements for multiple ISR capabilities at one time, they should also predict non-tasked cross-cuing opportunities as well. Force packaging ISR serves to provide ISR coverage across

[313] *Theater ISR CONOPS*, 16.

[314] Cheater, "The War Over Warrior," 4.

[315] *Theater ISR CONOPS*, 20.

[316] *Theater ISR CONOPS*, 16.

disciplines for operations and entails detailed integration between the ISR assets and their mission planning teams. [317] Non-tasked cross-cuing, however, simply ensures that assets of complimentary capabilities are available to support one another as dynamic opportunities arise. While they will rely on formally established tactics, techniques, and procedures, crews may not necessarily coordinate operations prior to execution.

b. Scheduling ISR for Reaction

Scheduling ISR should be done with two specific goals: 1) to provide forces when required to requestors and 2) to provide stable, continuous coverage. It may not be possible to fulfill both goals simultaneously; however, when requests come in for assets at a particular time, that requirement should be met. With appropriate management of the diverse number of assets available, it should be possible to stagger asset times to provide for the greatest amount of coverage throughout the day.

By off-setting imagery collecting assets such as the U-2, Global Hawk, and fighters with tactical reconnaissance pods, it may be possible to provide sufficient imagery coverage throughout a 24 hour period to improve the ability to dynamically meet short-notice imagery requirements. The U-2 and Global Hawk in particular have many overlapping capabilities. Fighters with tactical reconnaissance pods provide a similar level of flexibility to that of the Global Hawk, though with a smaller collection deck. Planners should consider scheduling the Global Hawk primarily at times not covered by the U-2 and should schedule fighters with tactical reconnaissance pods at the same time as the U-2 to make up for the lack of flexibility provided by the Global Hawk.

3. ISR Mission Tasking

According to the *Theater ISR CONOPS*, the organization conducting COM will direct ISR actions and articulate the ways and means by which ISR will achieve the desired effects based upon its "inherent understanding of ways and means."[318] It is foolish to believe, however, that individuals located at the CAOC will have sufficient

[317] *Theater ISR CONOPS,* 18.

[318] *Theater ISR CONOPS*, 7.

understanding of the needs of the customer because of the highly integrated manner by which ISR is now used in conjunction with organic ISR capabilities as well as with operations. For this reason, specific ISR tasks should be developed as close to the level of the executing decision maker as possible with clarification or additional in-puts supplied by ISR planners higher in the chain of command. At the CAOC level, ISR planners will be responsible for matching the most appropriate ISR asset with the capabilities required by the ISR tasking provided by the supported unit's planners.

G. ISR REQUEST PROCESSES

1. Maintaining Synergy throughout Planning/Tasking

The Effects Working Group (EWG) at the BCT plans the operations to be conducted at the BCT level and below, integrating kinetic and non-kinetic effects with operations and ISR assets. In many cases, these missions will require detailed coordination between airborne crews and their supported ground units as well as between geographically separated analytical elements and their counterparts within the BCT. Developing an *ad hoc* structure to which the CFACC can integrate Air Liaison Officer (ALO), electronic warfare officer (EWO), and ISRLO planners to represent CFACC concerns and to best manage airborne assets ensures the best possible implementation of capabilities. Unfortunately, this plan does not always survive the tasking process in tact, leaving the BCT under-resourced because of poor coordination/integration of the operations and intelligence elements at higher echelons.

At the Division level, networking occurs in the more formally aligned Effects Synchronization Meeting (ESM), where representatives for the various assets meet to determine priority of support for each of the subordinate BCTs. Though many organic capabilities were provided directly to the BCTs, more "high demand, low density" capabilities such as Army attack aviation assets (AH-64 Apaches), Close Air Support (CAS) sorties, and CFACC UAV assets were only aligned down to the Division level which must then determine the priority of each BCT request to ensure it received the support necessary to accomplish its missions. A representative from each BCT coordinates the requests for assets, providing explanations as required on subordinate

operations, and bridging the gap between BCT planners and division asset managers to allow for seamless continuity of planning should assets be denied or substituted. At this level, an ISRLO is still required, but is now focused specifically on the tasking process to ensure that BCT needs are accurately reflected in their formal requests in order to make the "best case" for their support to higher headquarters. The DART should also be involved at this level in order to manage the personnel necessary to meet the BCT's analytical and production needs, a process that may require realigning shifts of personnel or shifting analysis to another organization.

The Corps level (the Multi-National Corps/Force Iraq) does not currently have any such networks developed.[319] Instead, when the ESM at the Division identifies its priorities for support, it then submits its requests up two different channels, one for operations support (to include CAS) and one for ISR support. Those responsible for approving support for each of those two channels do not speak to each other in any formal or regular fashion, allowing for missions to be under supported in one area or the other.

For example, in countering the indirect rocket fire that is rained down upon coalition bases by insurgents, a BCT may request that the JSTARS provide tracking of any vehicles that depart the rocket fire launch point. Unfortunately, because of the traffic and radar shadowing caused by buildings in the urban environment, the JSTARS is often unable to track fleeing vehicles for very long, so they need to be able to "hand off" the target to another asset quickly. UAVs fly too slow and too low to be able to move quickly around the battlespace to fulfill this role. Manned fighter aircraft (such as the U.S. Air Force A-10 or F-16), however, have a number of advantages over the UAV. The pilot, using peripheral vision, can in fact detect a rocket launch based on the smoke trail of the rocket, the motion of the rocket itself, or the flame at launch and immediately slew the on-board targeting pod to the general launch location. More importantly, the JSTARS can send a digital message directly to the fighter that the pilot can then select and automatically cue the targeting pod to the moving vehicle the JSTARS has begun to

[319] MNC/F-I Collection Manager, e-mail message to author, April 28, 2009.

track.[320] By flying higher, the fighter has better line of sight to more areas of the battlespace than a UAV and higher speeds allow the fighter to move from one location to another to more rapidly acquire the fleeing target.[321] Unfortunately, the pilot in a fighter is often dealing with multiple issues at once, not the least of which is watching out for other aircraft in the compressed airspace over certain Iraqi cities, and flying is difficult to do while also keeping the targeting pod focused on a speeding vehicle among traffic. Therefore, it is often necessary to pass the target off again, this time to the UAV which has now had sufficient time to move to the right location and has the loiter time necessary to remain over the target for as long as necessary. Since the pilot on the UAV is not responsible for also steering the camera, a function performed by a sensor operator, the pilot is not as task saturated as their fighter counterpart. Unfortunately, most UAVs in theater lack the ability to employ weapons and even those that do are less likely to receive permission to fire than a manned asset (in order to better manage concerns regarding collateral damage). So when it is time to engage the rocket firing insurgents, the UAV must hand the target off again to U.S. Army attack aviation assets.

From this example, we see a mix of both ISR assets (UAVs and JSTARS) and operations assets (CAS fighters and attack aviation), which are requested through different channels by the Division on behalf of the BCT. At the BCT EWG, the plan is hashed out by all concerned parties. At the Division ESM, ISR and operations representatives coordinate together to ensure that the BCT with the most pressing issues receives the assets necessary. But the Corps has no means to ensure that those requirements are met. If the Corps C2 (intelligence division) decides to provide JSTARS support but has no UAVs to spare, it does not relay this short coming to the C3 (operations division) before they assign CAS to the mission. Therefore, without the UAVs, the CAS assets may not get used at all because they will have no one to whom to

[320] Lambeth, “Airpower Against Terror,” 254.

[321] Cheater, “The War Over Warrior,” 12.

hand their target off. Without knowing this, C3 assigns CAS to a BCT that will not use them while depriving another BCT of the assets that may be required for a mission to be executed.

What is required is a form of Asset Coordination Meeting (ACM) that like the ESM at the Division will be a formally organized network of asset representatives and liaisons from each of the divisions to explain Division and BCT operations and priorities. The ASM would then be able to highlight missions that cannot be supported in total and which may require shifting assets to the next highest priority because they have fewer integrated requirements. The ISRLO would be present at this level, primarily to ensure that all integration has been properly planned for and that assets are not wasted on missions that have not been fully integrated. The DART will not have a role at this level but representatives for each of the assets (the U-2, Global Hawk, Predator, etc.) will need to be available to ensure that they can provide the interoperability required by the plan.

This problem is replicated at the CAOC where a Master Air Attack Plan is developed separately by the A2 (intel) and A3 (operations) staffs. Though both are present at the final briefing each day to the CFACC explaining where various assets are assigned, they do not coordinate habitually prior to that briefing. Unless specific reference is made in a CAS request to an ISR tasking or an ISR tasking references a specific CAS request, ISR and CAS planners do not ensure that assets which were planned for and coordinated at lower echelons are in fact available.[322] Therefore, a request for CAS aircraft could be submitted including notes that the aircraft will be cued by FMV to targets but without identifying the ISR request being submitted for the FMV assets, CAS planners do not seek out ISR planners to confirm that FMV assets are actually being tasked. By simply ensuring that a single MAAP is developed jointly by the A2 and A3 staffs, this concern can be largely eliminated. Since the Master Air Attack Plan (MAAP) is developed at the CAOC, there is no need for an ISRLO, however, asset liaison officers will need to be present to ensure all planning considerations have been achieved. Additionally, the Army will likely rely on its Battlefield Coordination

[322] Michael Kometer, e-mail message to author, April 27, 2009.

Detachment, their representative element to the CAOC, to be a part of the MAAP to ensure land component concerns are understood. (See Figure 38, Proposed Pre-planned Effects Request Channel.)

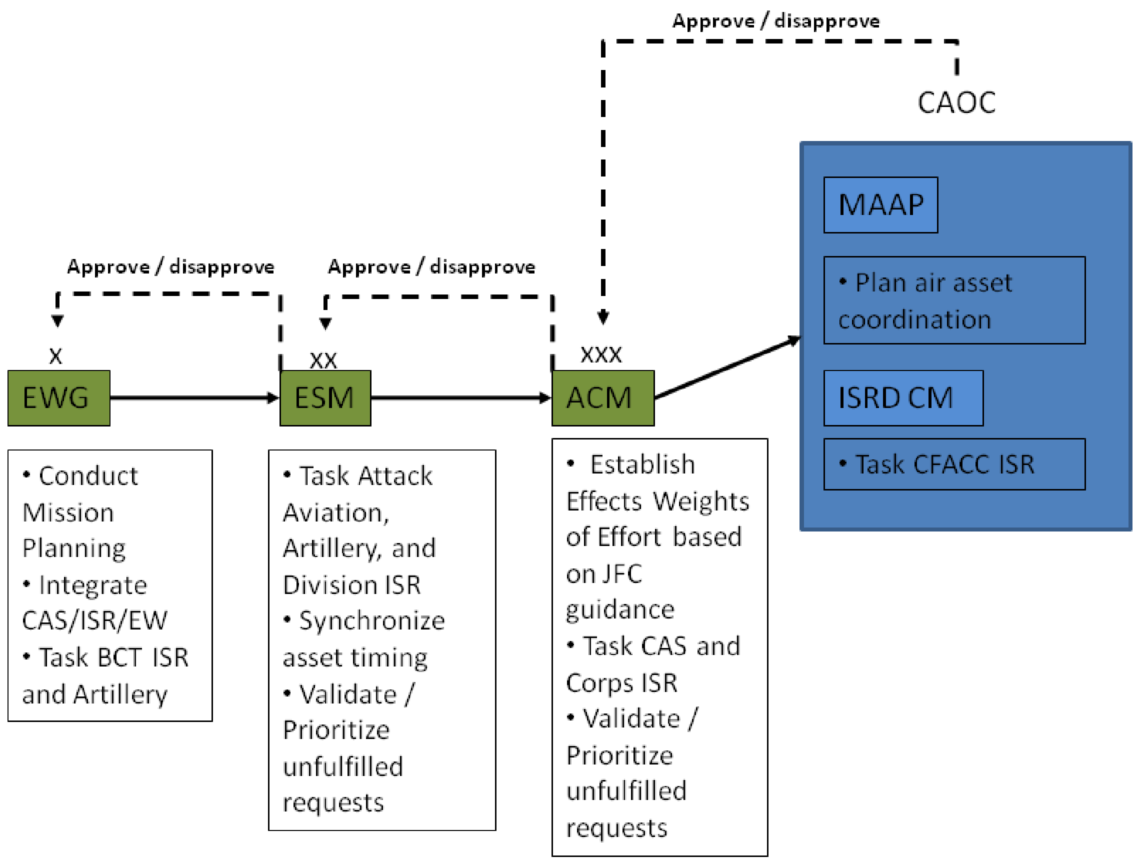

Figure 38. Proposed Pre-planned Effects Request Channel

a. Single Tasking Process

Unfortunately, there are two distinct tasking processes currently in place. The ISR tasking process which is largely conducted through PRISM and the CAS tasking process that is conducted through the Air Support Request process. As systems develop both ISR and kinetic strike capabilities (as in the case of the MQ-1, MQ-9, and newly armed Warrior Alphas), the confusion between tasking the ISR portion of the asset and tasking the kinetic portion of the asset is becoming urgent. An inability to reconcile these differences can lead to over tasking the asset, because neither tasking process has

visibility on the other, or misusing the asset when its capabilities could be more effectively accomplished by a different asset.[323] At present, CAS fighters are often tasked with reconnaissance missions despite the fact that ISR assets are more capable in that role. Similarly, the Predator's Hellfire missiles are requested in situations that are actually better suited for larger weapons systems or fighters with a greater array of weaponry options. In both cases, the tasking of the wrong asset for a role deprives that asset from other users who may need its more appropriate capabilities.

Furthermore, because of the lack of visibility between the two processes, there is often a certain amount of "fratricide" in capabilities. For example, units have requested through the ASR process an electronic jamming capability to deny an insurgent leader from rallying forces to his defense during a raid by ground forces. Unfortunately, intelligence personnel requested signals intelligence (SIGINT) support in order to find that insurgent leader based upon the frequency to be jammed. SIGINT was unable to locate the leader (because his communications were being jammed) which meant that ground forces were unable to conduct their raid, for which the jamming was necessary in the first place. Both the SIGINT asset and the jamming asset were then tasked futilely on a mission when they could have been used separately on different missions effectively, or could have been planned for and integrated more appropriately on a single mission. (See Figure 39, Stove-piped Request Process.)

[323] Cheater, "The War Over Warrior," 17.

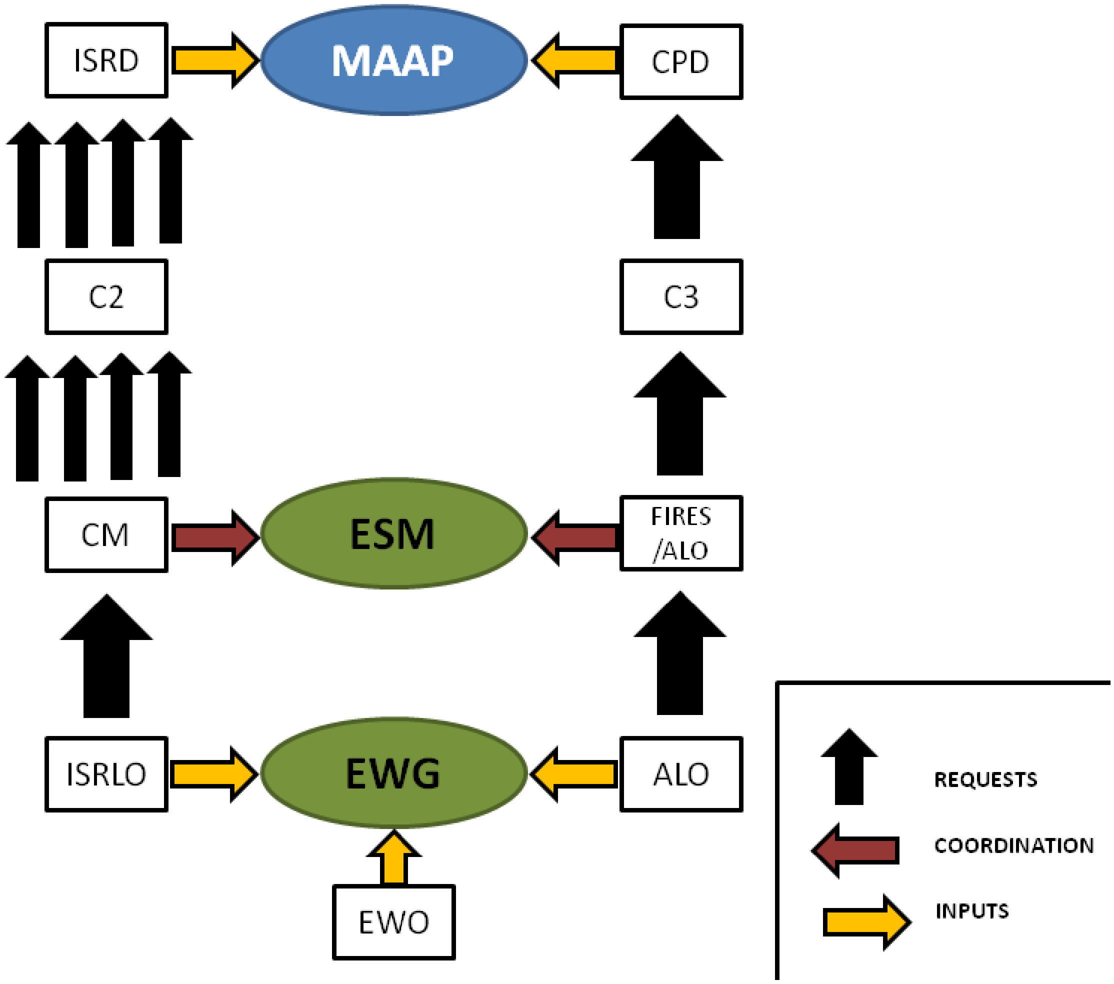

Figure 39. Stove-piped Request Process

The use of the Effects Working Group to pull the involved planners together has greatly reduced such problems. Still, the inability to task assets together has limited the confidence that both assets, each contributing significantly to the mission, will be made available to the mission. No SIGINT mission, and the presence of the jammer is wasted. No jammer, and the ground force may be unduly threatened despite their ability to find their target (and may thus cancel the mission before execution).

b. Requirement for 2/3 Integration

The lack of integration between the intelligence side of the house and the operations side of the house create inefficiencies in the employment of all assets (ISR,

kinetic, and non-kinetic), hinders the flow of information, and provides opportunities for the enemy to exploit the seams in intelligence-operations activities.[324] One integrated process should incorporate both kinetic and non-kinetic (to include electronic warfare and ISR) taskings[325] to provide better visibility throughout the process on integration of assets and potential for duplication of effort.

The DD Form 1972.1 Joint Integrated Air Support Request (JIASR), briefly discussed in Chapter III, may provide the integration required for COIN operation planning. Though based on the Air Support Request used to task Close Air Support missions, the DD Form 1972.1 also serves as a formal means for integrating assets with supported units. Not only does the form provide sections for requesting specific "effects," it also details how assets will communicate with the supported unit, who the point of contact within the unit will be, and provides the overall concept of operations for all assets. Rather than submitting separate forms for each asset or type of asset (CAS vs. electronic warfare vs. ISR), all requests for support of one operation are submitted via a single form. This form, in turn, provides guidance to supporting units on who to contact within the supported unit for further guidance and a vision for how their effects will be integrated with other supporting and supported elements. (See Appendix D.)

The EWG would produce the DD Form 1972.1 via the ALO, EWO, and CM/ISRLO who would submit the request to the ESM at the Division. The Division would collate all JIASRs from the various BCTs and would develop a schedule of effects requirements, highlighting where the same asset would be able to flow from one BCT to the next or where overlaps would necessitate additional asset support. This schedule of effects would be forwarded to the ACM at the Corps level to request additional asset support at the appropriate times. The JIASR would be forwarded as well to support integration requirements and to answer questions about specific effects required. The ACM would prioritize all effects requests and fulfill as many as possible with organic assets before forwarding the JIASR and the schedule of unfulfilled requests to the CAOC

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324 Cheater, "The War Over Warrior," 10.

325 Ibid., 29.

for asset scheduling and planning. By including the JIASR with all scheduling and tasking products, integration of assets and the integrity of the plans developed at the BCT level will be maintained.

It is important to note that actual tasking of assets would be conducted via the appropriate authorities. While there has been some push to begin tasking the MQ-1 and MQ-9 systems via the same process as CAS assets, this overlooks the inherent differences between these types of assets. Tasking a CAS asset is limited to ensuring that the right aircraft armed with the correct ordnance is available at the time and place of the requesting unit's choosing. ISR assets, however, must deal with additional considerations. ISR asset tasking must account not only for the asset carrying the sensors and for ensuring that the right sensor is loaded on the aircraft, but must also ensure that the right operators (linguists, special imagery analyst, etc.) are made available for those sensors (as in many cases, the sensor operators are not part of the flying crew), that the communications networks (which must be shared by multiple platforms and theaters) are tasked to support the operation, and that the reach-back exploitation nodes are not over tasked and are properly manned for the required exploitation. The standard Air Support Request (ASR) process is only designed to manage the platform itself, whereas ISR tasking is much more concerned with the supporting infrastructure that is even more limited than the number of flying assets.[326] (See Figure 40, "Agnostic" Tasking Process Combining ISR and CAS Planning and Tasking.)

[326] Captain Amanda R. Figueroa, e-mail message to author, September 29, 2009.

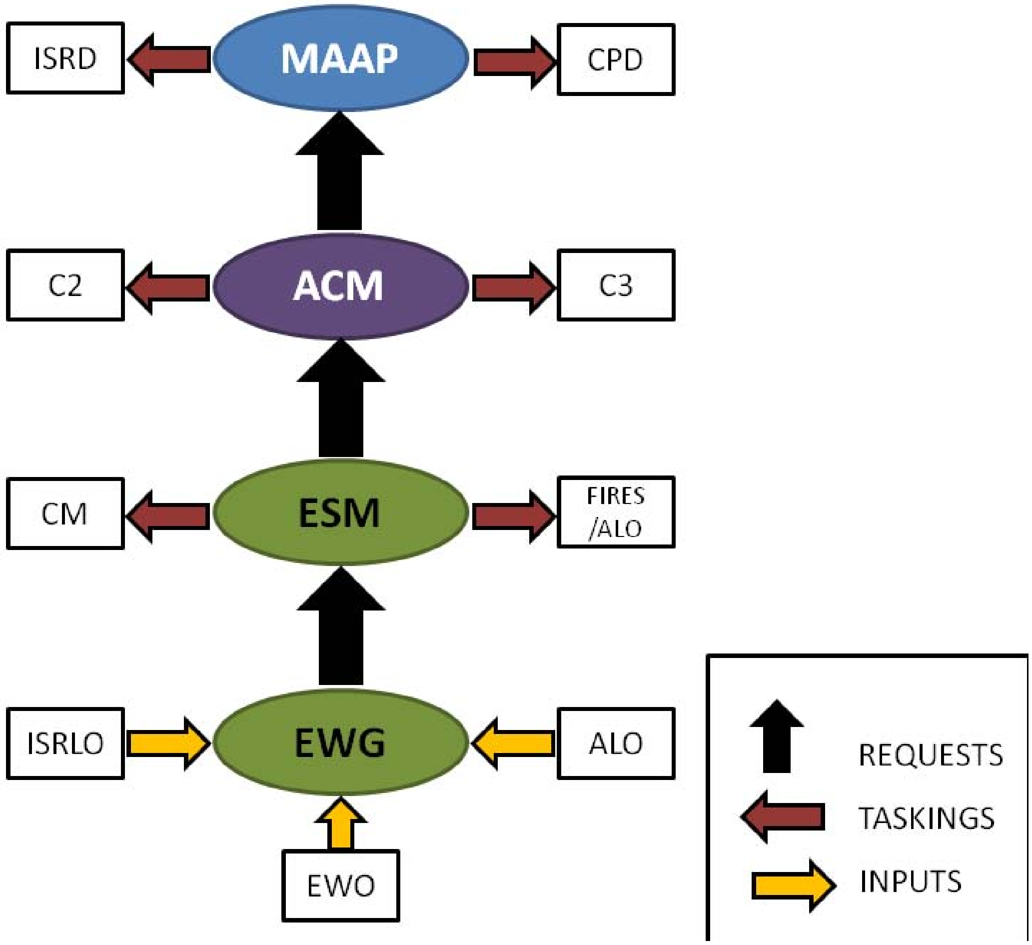

Figure 40. "Agnostic" Tasking Process Combining ISR and CAS Planning and Tasking

2. Pre-planned ISR (Scheduled ISR Assets)

Generally, there are two types of ISR tasking requests: pre-planned and immediate. Immediate ISR tasking requests, usually referred to as dynamic re-taskings, will be addressed in Chapter V. Pre-planned ISR requests are filled with scheduled missions.[327] Due to the limited number of ISR assets and the volume of ISR requests, there is little to no potential for "on-call" ISR assets in which assets are placed in orbit near potential target areas or are prepared to launch from nearby bases on short notice.

[327] JP 3–09.3, III-26.

"Direct support" missions, however, provide increasing flexibility in meeting ISR requirements that cannot be identified in sufficient detail prior to mission execution.

a. Submission Process

Pre-planned requests are submitted as soon as a collection requirement is identified during the planning process discussed in Chapter III.[328] Due to the validation necessary for collection requests, there are strict timelines associated with such requests that demand timely submission. Submission of requests should not be delayed to conduct detailed planning in order to meet cut-off times.[329] As a minimum, the requesting unit should identify the type of target to be collected against, the time ISR is required (either the coverage time or the last time information is of value), and any other unique mission requirements (ability to communicate directly with ground units, the ability to engage targets kinetically, etc.)[330]

Direct support missions represent those circumstances in which ISR support has been anticipated but specific targets, areas of operation, or times cannot be provided prior to submission deadlines or, in some cases, prior to mission execution. Instead, a block of time for ISR support may be requested[331] in which an asset is made available for direct coordination with the supported unit. The ability of most ISR assets to provide such support is limited though current operations have proven the successful use of the RQ-4 Global Hawk and fighter aircraft equipped with reconnaissance pods (imagery pods not to be confused with FMV targeting pods) in the direct support mission. Direct Support missions do not represent the ideal mission profile, despite their flexibility, due to the inefficiencies in meeting many ISR requests and should be used as the exception rather than the rule.

(1) PRISM as a difficulty in coordination. Technology is the process used by an organization to turn inputs into outputs. This can include the

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[328] JP 3–09.3, III-26.

[329] Ibid., III-27.

[330] Ibid., III-26.

[331] Ibid., III-27.

techniques as well as the machinery, although Mintzberg makes the point of differentiating “technical systems” as the “the instruments used in the operating core to transform the inputs into output.”[332] This differentiation is important in helping to alleviate the common association of technology simply with the machinery, rather than the ideas or knowledge that employ those systems. To understand the difficulties that the Air Force has in adapting itself to the COIN environment, however, it is necessary to speak directly to the systems employed by the ISR community.

The Planning tool for Integration, Synchronization, and Management (PRISM) is the “system of record” used by collection managers to submit “production requirements” (that is, requests for ISR collection) to higher headquarters. Despite its name, PRISM was designed specifically to be a tracking mechanism of such requirements, ensuring that each requirement had associated “essential elements of information” that were to be collected, that they were properly prioritized from an approved priority list provided by the joint force commander, and that as collections occurred their success, failure, or inability to collect was sufficiently tracked.[333] PRISM has gone beyond simply being the higher headquarters tool for tracking requirements to being the means by which subordinate organizations submit their requirements. The importance of this can not be understated.

PRISM provides a number of very useful capabilities for the automation of the collection management process. The system tracks the timing of each target to include when it was last collected and when the next collection will be required for targets that are collected again over a period of time. The system is designed to collect the details of the collection, though this function is largely impacted by the incompatibility of other ISR systems. Lastly, PRISM provides automated prioritization of submitted collections requests by incorporating theater collection priorities, producing the JIPCL automatically.[334] Combining these capabilities, PRISM provides the

[332] Mintzberg, *Structures in Fives: Designing Effective Organizations*, 128.

[333] Jeffrey Johnston, “The Way Ahead: Operationally-Linked ISR in a Dynamic Battlespace,” (USAF Weapons School paper, Nellis AFB, NV: USAF Weapons School, June 14, 2008), 2.

[334] Ibid., 3.

collection managers at the CAOC with a prioritized list of targets to be collected each day, automatically. For the customer, PRISM provides transparency in the ISR process, by allowing the originator of a collection request to track their nomination through the validation, approval, collection, exploitation, and dissemination phases.[335]

With regards to tracking ISR taskings and automating the prioritization of the targets, PRISM is very effective. It begins to suffer with regards to the actual process of making a collection request. PRISM is a very structured format for making ISR requests based on entering data into a number of carefully crafted data tabs. The first tab, for collection requirement, defines the collection effect desired from a particular target. The second tab, which covers the exploitation requirement, provides detailed directions to the exploiting agency on what information is needed from each target in the form of essential elements of information and specific reporting requirements to include dissemination format and means of communication.[336] Unfortunately, despite all of the details that go into PRISM, none of the collection/exploitation units tasked by the CAOC use PRISM, requiring collection managers at the CAOC to export the PRISM data into an excel document. The document is then formatted to meet the needs of the collection and exploitation units and then emailed out.[337]

Not only does this detract from the automated utility of PRISM, the conversion of data from one format to another is detrimental to the needs of the collectors. Notably, there are sixty-plus fields of data that must be entered by a requestor in order to create a new collection request nomination. Of those 60 fields, the collection manager who is responsible for building the collection deck at the CAOC only has access to 24 fields. Missing from the CM's visibility are directions on look angle, EEIs, exploitation priority, and any synchronization requirements. When the data is then exported to excel, the new format is reduced to less than ten data fields, excluding such information as time of earliest imaging, latest imaging, instructions for collection, and

[335] Johnston, "The Way Ahead," 6.

[336] Ibid., 4–5.

[337] Ibid., 7.

any operations that the collection is supporting.[338] All of this information is available again by going into PRISM and viewing each target individually but for the purposes of planning missions, PRISM fails to provide sufficient coordination of effort.

The very structured nature of PRISM demands a very structured request format. For example, most collection managers and their intelligence analysts are trained to simply request an "ISR effect." They are admonished not to request a specific system or sensor but rather to provide their requirement in as specific a description as possible so that higher headquarters collection managers working with platform liaison officers can match the best system/sensor to the requirement. (For example, instead of asking for a Predator, collection managers should request "real time tracking and monitoring of individuals" which allows not only the tasking of a Predator but also of the Army's equivalent Warrior Alpha, I-Gnat, and Shadow UAVs along with the manned Navy P-3 or the C-130 Scathe View). PRISM does not work that way. Instead of being able to enter a requirement for "imagery along route Jackson" a collection manager must provide a specific geographic location (in latitude and longitude or military grid reference system) and a radius around that point for which they require imagery. For a point target, this is not a significant problem, for a route reconnaissance mission (such as to look for improvised explosives or to prepare a convoy mission), this requires that the collection manager request imagery of multiple points along the route. To know how far apart to request points (to prevent excessive overlapping or gaps in coverage), the collection manager must know the field of view of a particular sensor. Therefore, rather than request an "ISR effect" in the form of "imagery along route Jackson," the collection manager must request imagery from a specific sensor (such as the U-2) at points of a given distance from one another based on the anticipated sensor to take those images.

Further complicating matters is the manner in which collection requests are processed by intelligence discipline. PRISM organizes collection requests as "imagery," "signals intelligence," "full motion video," etc. This in turn drives an organizational structure that is established in the same format so that higher headquarters

[338] Johnston, "The Way Ahead," 9.

collection managers are divided into "IMINT," "SIGINT," and "FMV" collection managers (respectively). On first look, this organization makes sense. If the subordinate analyst was truly able to request "imagery along route Jackson," then the IMINT collection manager would be able to focus just on imagery platforms capable of providing that imagery. ISR, however, is best used when "layered" with a specific intent to provide "cross-cue." That is, a signals intelligence asset detects communications suggesting that an attack is going to occur in a particular geographic area. JSTARS is then able to narrow down that area by detecting ground moving target indicators (GMTI) towards friendly forces. This information is then passed to a Predator UAV which is then able to provide full-motion video coverage of the identified "movers" to confirm their identities as hostile forces moving to engage friendly forces.

If a request for layered SIGINT, GMTI, and FMV support is submitted, it is done so in a piecemeal fashion because PRISM divides up the manner in which requests are submitted based on intelligence disciplines and the higher headquarters collection managers are similarly divided. Therefore, the SIGINT collection manager reviews the request and agrees to provide the requested support. The GMTI collection manager reviews the request but compared to other priorities on their list, denies the request. The FMV collection manager reviews the request and approves it. This leaves the requesting unit with a capability to initially detect the threat and an ability to confirm its identity once found but no ability to actually find the activity in the necessary time frame. If the subordinate collection manager or S2 recognizes this gap in capability, they may willingly give up the SIGINT and FMV coverage with the understanding they won't be able to use it effectively and someone else might be better supported. More likely, however, they do not recognize the gap in coverage, choose to "take whatever they can get," and end up misusing ISR assets because they are not sufficiently coordinated.

(2) JIASR as a means of coordinating effects. ISR enables operations and this is particularly true within a counterinsurgency campaign. As such, ISR efforts and assets must be closely coordinated and their operations integrated with

the operations of the supported unit to ensure collection requirements are fulfilled.[339] Ideally, a new tasking system needs to be developed to be employed by all elements of the ISR process.[340] At a minimum, however, a process must be established in which operations personnel, collections agencies, and exploitation units are able to share an understanding of the effects desired and the taskings assigned. This should include providing the collection planners and the analysts the contact information for the supported unit to allow for clarification of the tasking and coordination with organic ISR capabilities or operations.[341] All participants in an operation, to include the ISR supporting players, must have access to the same planning documents, desired effects, and context for explaining their role in the successful operation. While it may be possible to provide a link to such documents within the details window of PRISM which should also address the nature of the operation, the pertinent timelines, and the desired effects for ISR,[342] it is likely to require a departure from the current format which is exclusive to ISR. The previously discussed DD Form 1972.1 Joint Integrated Air Support Request (JIASR) is likely one of the best examples of the direction this process should be heading.

b. Ad hoc Processes

A flexible ISR tasking process is required because deliberate operations could be executed based upon information less than 12 hours old.[343] Unfortunately, the *ad hoc* process currently employed for short notice tasking of ISR assets tends to be over-centralized which creates unnecessary delays in collection.[344] As designed, requestors must submit their requests through the same channels required for a pre-approved request. The process is currently done sequentially via e-mail rather than by broadcasting the request through a medium such as chat, which would allow multiple echelons to

[339] Johnston, “The Way Ahead,” 8.

[340] Johnston, “The Way Ahead,” 10.

[341] Ibid.

[342] Ibid., 14.

[343] Cheater, “The War Over Warrior,” 15.

[344] *Theater ISR CONOPS*, 24.

review the request at the same time. Furthermore, *ad hoc* request are all considered additions to the collection deck with no consideration for the ability to swap out targets.

In this fashion, a BCT collection manager may recognize that one of their scheduled collections is now obsolete (possibly having been overcome by events) and is no longer of value to the unit. In submitting a request for a new target, that does have value, there is not currently a method by which the new target can be swapped for the old target. By allowing supporting ISR units to communicate directly with supported units to coordinate swapping of old targets for new ones, the *ad hoc* process can be made considerably more responsive.[345] All requests for such additions must be sent to the ISR unit because collection managers throughout the chain-of-command lack the ability to evaluate an asset's potential to add a new target to its collection deck. Again, coordination directly between the supported unit and the ISR unit would allow such requests to happen much faster and do not require that the CRM or COM approve every *ad hoc* request.[346]

Should the requestor want a target added that will impact the collection deck (the ISR unit determines that it cannot be added without dropping another target and the supported unit does not want to swap targets), higher headquarters will need to be involved to determine the appropriate prioritization of the collection. Simply bumping targets from other units will require the approval of the highest affected CM. If both BCTs belong to the same division, the Division CM should be authorized to decide which BCT is higher priority and whether the new target can be added and the old one dropped. If the BCTs are from different Divisions, the decision will have to be made at the Corps level. In circumstances in which the asset will be required to significantly change its flight path or must extend its flying day, the CAOC must be involved in the decision to ensure that future missions will not be unjustly impacted.[347]

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345 *Theater ISR CONOPS*, 24.

346 Ibid.

347 Ibid.

H. CONCLUSION

1. Operation BK FAMINE Revisited

a. Inability to Plan for Optimal Assets

By the end of June 2007, the Corps's misnamed process of "apportioning and allocating" FMV assets had begun to grow in acceptance. BCT CMs were still reluctant to trust that CFACC assets would be present and still tended to assign organic FMV assets, despite lesser capabilities, to their highest priority targets. The Division ISRLOs, having been part of the decision to align assets in this way, were more in tuned to Corps considerations and pushed CMs to assign higher priority missions to CFACC assets. In planning for Operation BK FAMINE, the ability to predict which FMV assets would be available for mission execution was a considerable benefit that allowed for better integration of capabilities and coordination with the supporting crews.

Unfortunately, the DART concept had not yet been fully developed and the ability to coordinate with geographically separated analysts was complicated to the point of being impractical. This drove the need to use very detailed EEIs and explicit instructions to collectors and analysts to ensure that all required information was collected, analyzed according to very precise needs, and distributed in a timely fashion to specific customers. The more detailed that such directions became, the more chances developed that miscommunications would occur, required actions would be missed, and intelligence would go unactioned.

Preventing CMs and ISRLOs from specifying specific asset requirements, rather than requesting effects, crippled the successful execution of the mission. Corps collection management team members regularly refused requests for specific assets despite expressed requirements that could only be fulfilled by that asset due to timing, communications, or flight parameter issues. Instead, subordinate CMs had to request the effects required, with such explicit direction that the asset was all but assumed. Still, different assets would be assigned that tasking and because of their inability to fly at the times necessary or to communicate in the fashion required, the mission failed on more days than it succeeded.

b. Lack of Coordination at Higher Levels

With the exception of the FMV assets, subordinate BCTs could not accurately predict when their requests would be fulfilled based upon priorities. Despite labeling collection (and CAS) requests with the key words of high prioritized targets (specifically IEDs), other requests achieved higher priorities. More importantly, because targets were prioritized individually versus as a package or a mission, even when some assets were made available, others were not.

Several nights over the total BK FAMINE, operations were wasted when CAS requirements were fulfilled but ISR assets were not (or only partially fulfilled). On other nights, ISR assets were available but no CAS assets were prioritized for the mission and therefore overall execution suffered considerably. On such occasions, assets were re-rolled by the BCT or sometimes the Division to other operations. As these were not the taskings to which they had originally been designated, the assets were often pulled from the supported unit and sent to other "higher priority" targets and a "stern warning" was issued to the offending CMs and ISRLOs for abusing the system.

2. Operation MARNE HUSKY (August – September 2007)[348]

On August 15, 2007, Multi-National Division-Central, created by the Surge of forces in the spring of 2007, initiated Operation MARNE HUSKY to capitalize on the successes of Operation MARNE TORCH I and Operation MARNE AVALANCE. Having displaced Sunni insurgents from safe havens located in Arab Jabour and Salman Pak, Multi-National Division Central (MND-C), commanded by the 3rd Infantry Division, sought to conduct a series of air assaults throughout the Tigris River valley in order to keep insurgents operationally off-balanced. (See Figure 41, Red Oval Indicates Approximate Area of Operation MARNE HUSKY.) The terrain of the region was naturally imposing, divided by several canals and irrigation networks that limited ground mobility. These types of natural obstacles enhanced the insurgents' ability to conduct

[348] Operational planning details are based on conversations with the MND-C ISRLO in July-September 2007, though certain details have been altered to preserve operational security and to refine the narrative for ease of understanding.

ambushes against ground mobile forces through effective early warning. By coordinating ISR with air assault tactics, MND-C intended to counter-act these regional advantages and surprise insurgent forces before they could react.[349] This operation was unique in that it was actually led by an aviation unit as opposed to an infantry unit which would normally coordinate the air, ground, and artillery efforts.[350]

Figure 41. Red Oval Indicates Approximate Area of Operation MARNE HUSKY[351]

349 "Operation Marne Husky," Institute for the Study of War, http://www.understandingwar.org/operation/operation-marne-husky, (accessed July 31, 2009).

350 Multi-National Division Center Public Affairs Officer, "Marne Husky Ends With Capture of Insurgent," Camp Victory: Multi-National Corps Iraq Public Affairs Office, September 18, 2007.

351 After: "Iraq," CIA World Fact Book, https://www.cia.gov/library/publications/the-world-factbook/geos/iz.html, (accessed October 28, 2009).

a. Developing Trust

In June of 2007, MND-C received its first ISRLO, forward deployed from the CAOC's ISRD collection management team. The new ISRLO worked to educate MND-C's newly arrived collection managers on the processes necessary to receive ISR support from the Corps and CFACC and to train ALOs and JTACs on how to interact with and best employ ISR assets in support of C-IED and other operations. As their experiences with the ISRLO improved, the MND-C CM team began to integrate him more into their ISR planning. By the beginning of August 2007, the ISRLO for MND-C was a fully functioning member of the ISR collection management team.

In anticipation of Operation MARNE HUSKY, the ISRLO, the MND-C collection management team, and an unusually ISR-savvy JTAC began to develop a highly integrated ISR plan to support the proposed air assault tactics. The mission would require real time updates of insurgent activities to overcome the advantages the insurgents would have from their environment. The intent was to locate insurgent safe houses, use aviation assets to envelop the area, and then to monitor the situation with ISR to identify other targets for follow-on air assaults or to warn of potential ambushes or counter-attacks.

By August 2007, trust in the alignment of FMV assets with specific Divisions had taken hold and BCT CMs were prepared to plan high priority missions using CFACC assets. Furthermore, the CAOC's development of the Global Hawk Direct Support mission had been approved for use and the MND-C ISRLO would be the first to test the concept in a major operation. To do so, however, would require forward deploying to the Tactical Operations Center of the lead element, in this case, the 3^{rd} Combat Aviation Brigade (CAB). Working with the intelligence sections of both the 3^{rd} CAB and the 3^{rd} Battalion of the 509^{th} Parachute Infantry Regiment (3–509 PIR) that would be conducting the ground based portion of the operation, the ISRLO and the MND-C CM/ISR Ops teams developed a plan for the control of the ISR assets and the dissemination of critical information to the operations personnel.

b. Working the System

Although collection requirements were still prioritized based on target sets in August 2007, the Corps recognized that Operation MARNE HUSKY was of significant impact as to rate its own prioritization. Corps CM planners worked directly with their MND-C counterparts to understand the scheme of ISR operations and the requirements for higher headquarters support. The MND-C ISRLO maintained regular contact via phone, e-mail, and chat with both the Multi-National Corps Iraq (MNC-I) collections management shop and the CAOC ISRD (with whom he had very good relations based on his recent assignment there). In this fashion, all requests for support could be "walked" from the BCT and Division ISR planners to the Corps and on to the CAOC to ensure continuity.

This helped to ensure that required CAS and ISR requirements were not separated and that all echelons understood the delicate nature of integrating such efforts with the highly mobile air assaults to be supported. Despite the significant amount of time invested by the MND-C ISRLO to maintain mission integrity, there were regular disconnects between the intelligence and operations sides of the house at the Corps and CAOC levels. Prioritizing the mission over other target specific requests, helped to garner the best level of support but problems in coordination continued to be an obstacle.

By the end of Operation MARNE HUSKY in mid-September 2007, the collection management process had developed several improved techniques for managing direct support missions and for integrating intelligence and operations elements. The majority of this work benefitted from the personal attention of a few select individuals. So long as such techniques were "personality-based" and not part of formal doctrine, future operations would be imperiled by a system that mis-prioritized targets over units and failed to integrate planning and tasking at all echelons.

3. Integration of Planning and Tasking

Only through a carefully structured CM process can plans developed to be executed at the BCT level and below receive the full support of integrated kinetic and non-kinetic capabilities. By dividing the process from the beginning into operations (3)

and ISR (2) functions, integration suffers considerably. When ISR tasking requests are further divided into intelligence disciplines, the chance for seamless employment of all assets into successful mission accomplishment diminishes. Operations and Intelligence must be integrated not only in execution but throughout the planning, requesting, and tasking process.

Eliminating stove piped request processes through the use of working groups (such as the EWG, ESM and the ACM) that combine ISR, Operations, and supporting functions is paramount to the successful management of limited assets. Developing tools, such as the DD Form 1972.1, which promotes a common understanding of the mission and problems, encourages the appropriate allocation of assets both during planning and execution. Chapter V focuses on the execution of the detailed ISR plan and the employment of allocated ISR assets, with an emphasis on the need to react to dynamic situations and emerging targets.

V. EXECUTING ISR MISSIONS—LEARNING DURING EXECUTION

A. INTRODUCTION

Helmuth von Molke the Elder's admonition,[352] (paraphrased as) "no plan survives first contact," is taken for granted within the military. Therefore, for this paper to make the case to improve the manner in which intelligence, surveillance, and reconnaissance (ISR) is planned and tasked, as discussed in Chapters III and IV, must naturally lead to a discussion about the execution of ISR as well. ISR planners must take into consideration the need for plans to flex to a developing situation, but more importantly ISR in support of counterinsurgency (COIN) operations, particularly as it provides real time inputs to operations in progress, must be responsive. No plan, regardless of how carefully integrated it is among all stakeholders or how well it is resourced by the tasking process, should be considered a "final product." Rather, the need to modify the plan in execution must be accounted for both in planning and the delegation of authority.

Unfortunately, building flexibility into a plan or acknowledging that Global Hawk Direct Support missions are required to support on-going operations is insufficient for meeting the needs of ISR employment. Rather, a process for controlling ISR execution from the lowest level of decision making and effectively integrating all-source intelligence inputs demands personnel who are trained and experienced in the fusion of ISR capabilities. Such individuals will be required both at the tactical level for what is being referred to as "terminal coordination" as well as at higher echelons to enable the smoothest modification of target decks and sensor allocation.

The airstrike that targeted and successfully engaged Al Qaeda in Iraq's leader Abu Musab al-Zarqawi highlights the importance of fusing airborne ISR capabilities with a directed all-source intelligence network that included organic human intelligence

[352] Helmut von Moltke, cited by Tsouras, Ptere G. (ed.) *The Greenhill Dictionary of Military Quotations* (London: Greenhill Books, 2000), 364.

(HUMINT) and signals intelligence (SIGINT) components.[353] This operation was successful largely because it unified airborne and organic ISR collection efforts with operations under a single commander.[354] Though the special operations community benefits from the ability to directly control the majority of its assets, making even airborne ISR an "organic" element of the task force, the fusion of intelligence and the process by which dynamic ISR is re-tasked provide lessons of significant value to conventional units as well.

Lastly, the need for flexibility in ISR execution recognizes the "wickedness" of COIN-associated ISR problems, described in Chapter II. Due to the fact that such problems may not be fully understood even into the implementation of the plan, the problems may appear to be changing or growing.[355] Therefore, this chapter identifies the need for responsive ISR to further develop the commander's understanding of the problem and to implement the appropriate solutions or actions.

B. COMMAND AND CONTROL

At the tactical level, where the majority of the COIN fight is focused, airborne ISR requires a decentralized command and control system that gives supported units immediate access to information collected by airborne assets.[356] To provide the necessary level of situational awareness and flexibility required for rapidly evolving operations, the Combined Forces Air Component Command (CFACC) must delegate some aspects of planning and decision making to subordinate Airmen within the lower echelons of the theater air control system (TACS). Subordinate Airmen with an increased role and authority will be best positioned to provide innovative and effective

[353] As a High Value Individual (HVI) target mission, this mission is representative of only one of several ISR focus efforts but its lessons learned can be applied to a much larger appreciation of ISR support

[354] Flynn, Juergens, and Cantrell, "Employing ISR," 56.

[355] Conklin, "Wicked Problems and Social Complexity," 6.

[356] FM 3–24, 366.

CFACC support to the ground commander.[357] Timely decisions and situational responsiveness are keys to exploiting fleeting opportunities and countering the resourcefulness of an adaptive adversary.[358]

1. ISR Collection Operations Management Forward

For assets such as the Global Hawk, U-2, or unmanned aerial vehicle (UAV) assets, the ability to work directly with the supported units via chat or secure telephone permits customers to continuously update their collection decks as targets become "overcome by events" or higher priority targets present themselves. By coordinating directly with the collection assets, customers can receive coverage of their most current and important targets.[359] Throughout the mission planning process, the ISR unit can work directly with the supported unit to coordinate ISR integration with operational actions. Prior to the departure of the aircraft, the ISR unit could once more contact the supported ground unit to receive updates on the planned operations. Such updates would need to ensure that no new operations had been added, that operations had not been cancelled, for example due to the absence of a trigger event, or that operations had not been significantly modified requiring different product support or in-flight coordination.[360] Finally, prior to entering the Brigade Combat Team (BCT)'s area of operation, assuming that the asset is also flying in support of other units, the ISR mission crew could check in with the BCT for a final tasking update, understanding that the dynamic nature of operations demands continual revision of plans and actions.[361]

Unfortunately, not all ISR assets have this same capability with regards to connectivity and horizontal linkages. Airborne ISR crews, such as those on the Joint

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[357]AFDD 2–3, 9.

[358] AFDD 2–3, 16.

[359] Michael L. Downs, "Rethinking the Combined Force Air Component Commander's Intelligence Surveillance, and Reconnaissance Approach to Counterinsurgency," *Air and Space Power Journal*, Fall 2008, 7, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj08/fal08/downs.html, (accessed September 26, 2008).

[360] Downs, "Rethinking CFACC ISR," 7.

[361] Ibid.

Surveillance and Target Attack Radar System (JSTARS), RC-135V/W Rivet Joint (RJ), P-3, and C-130 Scathe View, may be limited to secure radio communications. Since most BCT collection management teams lack radio communications themselves, this limits the ability to change targets to when coordinating during mission planning and during last minute updates prior to aircraft departure. *Ad hoc* target requests or dynamic re-taskings must be accomplished via the established chain of command, most notably through the Corps to the Combined Air and Space Operations Center (CAOC) where the ISR liaison personnel located in the Intelligence, Surveillance And Reconnaissance Cell (ISARC) coordinate with the Senior intelligence Duty Officer (SIDO) to update tasking requirements once the mission has been initiated. Unfortunately, as has been noted previously, the CAOC is responsible for three theaters of operations simultaneously, is not adequately positioned to judge the ground commander's priorities,[362] and lacks the granularity required to understand the developing operational and ISR situation in any one particular theater.

For this reason, it is necessary to forward deploy the ISARC and its personnel to each theater, to the Joint Task Force level or its equivalent, which in Iraq would be the Multi-National Corps/Force Iraq (MNC/F-I). In so doing, the ISARC would gain invaluable insight into the operational concept of the theater commander, the progress of operations across the battlespace, and the delicate coordination of ISR and operations assets. Similar to the Air Support Operations Center (ASOC) in the Close Air Support (CAS) realm, a forward deployed ISARC will likely have more insight and situational awareness with regards to ground operations conducted at the corps level and below.[363]

The ASOC is the primary control node for the execution of immediate CAS requests. The ASOC coordinates with senior Army decision makers, particularly within the Corps Fire Support Element (FSE) to task on-call missions or to divert previously

[362] Steven Maceda, "Control of Theater Intelligence, Surveillance, and Reconnaissance for the Ground Commander," *Air and Space Power Journal*, Winter 2008, http://www.airpower.maxwell.af.mil/airchronicles/apj/apj08/win08/maceda.html, (accessed January 20, 2009), 2.

[363] AFDD 2–3, 63.

tasked CAS missions. In the event that additional CAS sorties are required beyond what has already been allocated by the CFACC, the ASOC interacts with the CAOC to scramble additional CAS sorties or to dynamically re-role other sorties into a CAS mission. The ASOC achieves effectiveness by being collocated with the Army's senior FSE (typically the Corps but may be delegated lower for independent Division or Field Army operations).[364] Furthermore, the ASOC serves as the initial coordination for on-coming CAS aircraft, providing updates regarding operations progress, threat warnings, or likely target areas. By providing this early situational awareness briefing, the ASOC prepares CAS assets for a more seamless integration with the ALO and JTAC plan in support of Army operations.[365] The Direct Air Support Center provides this same function for the U.S. Marine Corps.[366]

With a forward ISARC, co-located with the Collection Requirements Manager (CRM), the BCTs would achieve faster responses in their requests to modify target decks for those assets with which they are unable to coordinate directly. This is achieved by eliminating the additional layer of bureaucracy and the associated communications required by coordinating with the CAOC for theater ISR support.[367] When the ISR asset checks in with the ISARC at the beginning of their mission, the ISARC can then provide updated information regarding targets, operations, and the enemy situation, better preparing the ISR crew for their mission. Once the ISR crew enters the BCT area of operations, coordination will likely be conducted through the JTAC who retains a secure radio communications capability.

The ISARC, as a forward representative of the CAOC, would be responsible for keeping the CAOC informed of any changes that may impact crew or aircraft availability for future operations. This allows the CFACC to intervene in order to conduct effective

[364] JP 3–09.3, II-7.

[365] Ibid., II-19.

[366] Ibid., III-14.

[367] Maceda, "Control of Theater ISR," 2.

"airmanship" and manage the health of the airborne constellation.[368] Similar to the ASOC, the ISARC should be delegated the authority to re-task ISR assets or to task on-call ISR assets as necessary to meet supported commander requirements.[369]

A key element in the successful employment of the ISARC will be its integration with operations. For this reason, the ISARC should not be moved forward to the Corps intelligence sections, limiting its interactions to only intelligence staff and assets. Rather, the ISARC should be co-located with the ASOC and the FSE within the Corps operations center. Currently, the Corps collection management team in Iraq has the best visibility on the ISR battlespace, with an understanding of ISR priorities and available assets.[370] The Corps CM, however, is geographically separated from the Joint Operations Center (JOC) that monitors ground operations, air support, electronic warfare, and fire support integration. It is with the JOC that the ASOC is located and should be the future site of the ISARC as well, to provide the best integration of ISR with operations. This will largely help to alleviate the duplicate tasking of ISR assets and CAS assets in an over watch role. Careful integration must be conducted between the JOC located ISARC and the Corps CM with the understanding that for ISR to be effectively integrated with operations, ISR must be managed as close to the decision maker as possible.

Although there has been some discussion of moving ISARC capabilities even further down the chain-of-command, to the Division level, this is likely to be too decentralized to effectively manage theater ISR requirements.[371] ISR operations at the Division level certainly need to be integrated but this need is largely resolved by the coordination between the Division ISR Liaison Officer (ISRLO), Division Air Liaison Officer (ALO) and Joint Terminal Attack Controller (JTAC), and the Army Airspace Command and Control (A2C2) elements including the Combat Aviation Brigade (CAB)

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[368] Maceda, "Control of Theater ISR," 2.

[369] JP 3–09.3, II-7.

[370] Corps ISRLO and MNC/F-I Collection Manager, e-mail message to author, April 11, 2009.

[371] ACC/A2X TACS Strategic Development, e-mail message to author, April 22, 2009.

representatives. ISARC functionality, which is required for coordinating the sharing of limited ISR assets across the entire theater, can only realistically be performed at the Corps level.

Furthermore, the CAOC will require continued ISARC capabilities to manage those theaters with a less robust land component presence (as in the Horn of Africa) and to coordinate ISR support among theaters. While the JSTARS, RJ, U-2, and Global Hawk can all be transferred between theaters to support ISR requirements, the management of UAV bandwidth is often overlooked. While it is unlikely that Predator or Reaper aircraft themselves will be transitioned between theaters on a regular basis, the datalinks that control them and provide downlink of their information are equally as limited and can be delegated from one theater to the next as necessary. This may be due to a surge in ISR requirements or due to poor weather in one area of operations which prevents the flight of aircraft. Rather than allow a reach back control unit at Creech AFB to go unused, their datalink is simply fed to assets in another theater.[372] The ISARC at the CAOC is therefore best situated to coordinate such movements of assets or bandwidth as necessary to ensure maximum utility among all theaters.

2. ISR Effects Coordinator

Even with the forward deployment of the ISARC, it is not clear that ISR employment would be significantly improved. The ISARC provides the ability to re-task assets in response to fleeting targets and to update target decks based on mission developments, but the integration of ISR assets into operations remains a more tactical issue. Based on current employment, the ISARC does not appear to be able to sufficiently correlate intelligence information among the various ISR platforms. Rather, this task has been undertaken by either ISR crews in the execution of their mission or the supported ground units, which may or may not be continuously monitoring the necessary chat rooms in which intelligence information is reported. Therefore, a requirement exists for a single, designated coordinating authority to correlate intelligence data from CFACC

[372] Cheater, "The War Over Warrior," 48.

and organic assets and to compare it to the developing ground situation for effective ISR-operations integration.[373] The ISR Effects Coordinator (ISREC) would be tasked with executing ISR operations with assets allocated via the formal ISR tasking process to support a specific tactical operation.[374]

Many within the ISR community have argued that this position should be held by a member of the ISR crew, either the ISR mission commander at a Distributed Ground Station (DGS), the air intelligence officer (AIO) on the JSTARS, or the information integration officer (IIO) on the RJ as their current duties already demand a working knowledge of various ISR sensors and experience in correlating intelligence information from multiple sources.[375] This concept fails to acknowledge that the purpose of the ISREC is not simply to coordinate ISR effects but to coordinate ISR operations with the ground commander's operations. This requires not only an understanding of the supported commander's intent and planned operations, but also the ability to observe, in real time, the commander's decisions and the requirements generated for ISR support. For this reason, the ISREC should in fact be an individual already integrated into the Army tactical operations center (TOC).

The Air Force Special Operations Command (AFSOC) pioneered the employment of the ISR liaison officer. Unlike the conventional ISRLO who is often employed within the collection management section of the Army's special compartment information facility (SCIF),[376] the AFSOC ISRLO is employed in the TOC where he or she coordinates ISR efforts with the on-going operations of the maneuver forces and reports directly to the decision makers in the TOC.[377]

In addition to the ISRLO, AFSOC employs two to four additional enlisted "Predator Drivers" tasked with monitoring real-time full motion video feeds and

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[373] Captain Amanda R. Figueroa, e-mail message to author, September 29, 2009.

[374] Ibid.

[375] Ibid.

[376] Kuniyuki, "To Reign the Widening Gyre," 1.

[377] Grunwald, "Transforming Air Force ISR," 9.

providing guidance to the sensor operators. These enlisted members also coordinate exploitation at the reach back sites, optimizing ISR products and providing seamless integration of analytical support to operational decision makers.[378] A similar ISR Liaison Team (ILT), consisting of an ISRLO and an appropriate number of ISR Liaison Technicians (ISLTs) should be implemented within the conventional force structure at the BCT level and authorized to serve as the ISREC.[379] Through the use of such teams, efforts can be fully coordinated using effective interpersonal relationships by airpower functional experts working directly with supported forces leveraging the full range of CFACC ISR capabilities.[380]

The ISRLO would continue to function primarily in a planning and advisement role, providing the CFACC ISR expertise to integrate ISR assets and capabilities into the ground commander's scheme of operations. The ISLTs, however, would take on a larger role in the execution of ISR operations, potentially taking on the responsibilities of the Army's ISR Operations personnel with regards to the monitoring of various organic video feeds to alleviate the Soldiers' task overload and to leverage the full capabilities of both organic Army ISR assets and the CFACC fleet. Unlike the AFSOC model, ISLTs would focus not only FMV capabilities but would also provide the point of contact for integrating with Global Hawk (GH) and Tactical Reconnaissance (TACRECCE) Direct Support missions, interacting in real time with the DGS Analysis and Reporting Team (DART), and working with the JTAC for non-traditional ISR (NTISR) support.

To increase the effectiveness of real time ISR coordination and execution, the Common Ground Station (CGS) operators organic to the BCT who monitor the JSTARS GMTI feed and coordinate via chat with the JSTARS crew should also be moved to the TOC floor. The ISR Operations Soldier, typically being a trained imagery analyst, provides the best source for short notice imagery exploitation of raw imagery from the GH, U-2, and other imagery sources. The ISR Operations Soldier would also be the

[378] Grunwald, "Transforming Air Force ISR," 9.

[379] Ibid., 10–11.

[380] AFDD 2–3, 9.

conduit into the TOC for other organic BCT capabilities to include HUMINT and SIGINT products, as well as finished analytical products from the collection management team. The ISRLO, having contributed to the development of the ISR plan, can then provide oversight of the ISR execution, ensuring that the plan is proceeding smoothly and improvising solutions to snags encountered along the way. ISRLO direct oversight of such operations would likely be limited to those missions requiring intensive ISR support and integration. Day-to-day ISR support, typically limited to a few ISR assets at time, would be fully executable by the ISLTs and Army ISR Operations Soldiers.

As a matter of organizational design, it may be necessary to consider the physical interaction of key personnel with regards to the flow of information and the efficient execution of operations.[381] For example, Figure 42, BCT ISR Team in the TOC, provides a notional seating arrangement for the joint BCT ISR team located on the TOC floor. This arrangement is predicated on the likely flow of information as face-to-face interaction, despite technological advancements, still provides the best means for developing mutual understandings of a tactical problem.[382] Placing the JTAC next to the ISLT allows the JTAC to provide terminal attack guidance to fighter aircraft based upon the UAV full-motion video feed. Or it allows the ISLT to provide the same type of FMV analysis to a fighter's targeting pod video as that done for UAV feeds. Similarly, when needing to direct an FMV asset to a suspicious GMTI track, having the ISLT sitting beside the CGS operator facilitates such discussions. On many occasions, GMTI forensic backtracking highlighted potential cache sites or improvised explosive device (IED) emplacement areas which could then be better analyzed by the ISR Operations Soldier (a trained imagery analyst) based upon this more focused search.

[381] Jeffrey Pfeffer, *Managing with Power: Politics and Influence in Organizations*, (Boston: Harvard Business School Press, 1992), 119.

[382] Carlton Fox, "Beyond Why; the How: A Blueprint for USAF ISR Integration within the TAGS," (presented to the Air Combat Command Intelligence Flight Chief Conference, Langley AFB, Va, April 16, 2009), slide 22.

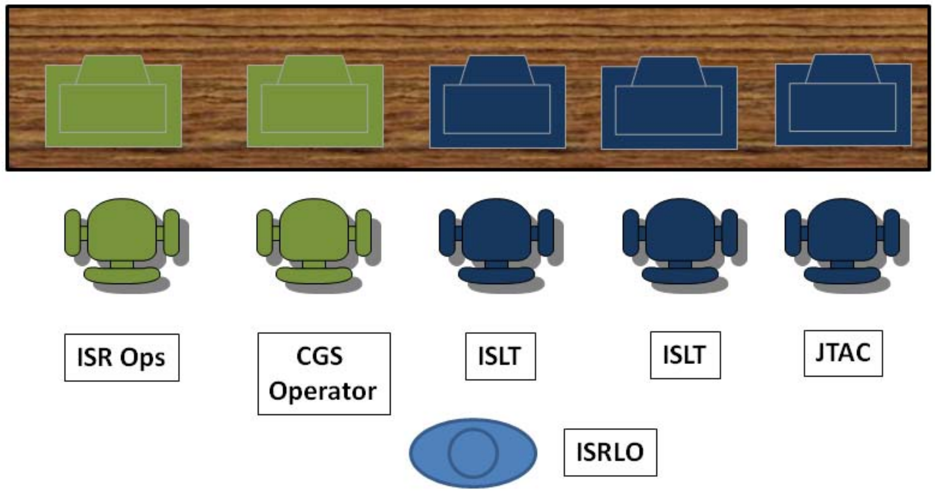

Figure 42. BCT ISR Team in the TOC

Additional considerations would likely place the Fire Support Element (FSE) next to the JTAC to assist in deconfliction in surface-based and airborne fires or to use the FSE's access to counter-battery radars for determining the location of rocket and mortar points of origin to which CAS aircraft could be sent in response. Naturally, different situations will require concerned parties to interact in different fashions but based upon personal observation and consistent executions, the arrangement depicted in Figure 42 seems most conducive to day-to-day operations.

Although the ILT will coordinate with sensor operators and ISR aircrews to optimize collection and support to ground operations, the ILT will need to take care in not "steering" ISR sensors through specific direction. ISR sensor operators and pilots will have the best insight into the latest tactics, techniques, and procedures for optimizing ISR asset employment and must be trusted to execute the commander's intent based on guidance provided by the ILT. Through constant communication of commander's intent and analysis of the provided products, the ILT and ISR crew can work together to move the sensor to the appropriate location or through the necessary actions to provide the

desired product.[383] Similarly, higher headquarters elements should avoid "second-guessing" tactical decisions made with regards to the employment of ISR, acknowledging that they lack the situational awareness available to the tactical decision maker. So long as such decisions are being made in accordance with commander's intent, the rules of engagement, and any additional "special instructions" (SPINS), supported customers and the ISR crews should be permitted to communicate horizontally and execute as necessary.[384]

3. Joint Certification Requirements

The duties of the ISR Effects Coordinator largely reflect those of the IIO aboard the RJ and the Airborne Intelligence Officer (AIO) or Technician (AIT) on board the JSTARS. In the case of the RJ, the IIO serves as the real-time coordination of intelligence between key nodes on and off the battlefield to include other airborne ISR platforms. By keeping all tactical intelligence platforms (to include DCGS and space-borne assets) on the "same sheet of ISR music," the IIO focuses collection and reporting efforts, synchronizing ISR effects with the supported commander's operations.[385] Likewise, the AIO/AIT on JSTARS correlates, analyzes, and fuses intelligence information from external intelligence platforms and leverages this information to support JSTARS operations and threat counter-tactics.[386, 387] At the DGS, the ISR Mission Commander (ISRMC), formerly the Mission Operations Commander (MOC), performs a similar role, coordinating intelligence sharing both among the DGS elements to include imagery (including full-motion video) and signals intelligence analysts, as well as with external intelligence agencies with such unique capabilities as conducting ground

383 *Theater ISR CONOPS*, 22.

384 Ibid., 22–23.

385 Craig Koziol, "Its All About IO Integration," *Spokesman Magazine*, July 2004, http://findarticles.com/p/articles/mi_m0QUY/is_2004_July/ai_n6142307/, (accessed August 10, 2009).

386 Timothy P. Albers, "Joint Surveillance Target Attack Radar System: Unlimited Potential—Limited Systems," (Master's thesis, U.S. Army Command and General Staff College, 2001), 8–9.

387 Nevin Coskuner, "Multimission Aircraft Design Study—Operational Scenarios," (Master's thesis, Air Force Institute of Technology, 2003), 21.

moving target indicator (GMTI) forensic backtracking to link suspicious GMTI movements with other intelligence signatures.[388]

As will be discussed in Chapter VI, it is therefore highly beneficial to have personnel trained in AIO/AIT, IIO, or ISRMC duty positions to execute ILT duties. Furthermore, while AIO/AIT, IIO and ISRMC personnel are primarily responsible for coordinating air and space borne intelligence information, the ILT will also require the ability to interact with Army organic ISR capabilities and the non-traditional ISR (NTISR) capabilities provided by the JTAC. The level of experience required to conduct such operations, however, is exceptional and the skills are easily lost. This requires not only regular maintenance via standards and evaluation programs but will also demand regular employment with a number of ISR assets. Keeping ILT members certified to perform these duties will likely be a significant complication.

C. DYNAMIC RE-TASKING

Dynamic re-tasking refers to the requirement to change the air tasking order during execution. In the case of ISR, this includes adding targets to the collection deck or moving an ISR orbit to a different location to achieve better visibility on a particular target. At present, such decisions are the "sole" responsibility of the CAOC.[389] Dynamic re-taskings may also involve higher priority collection requirements that may be accessible to an active ISR asset. The reconnaissance, surveillance, and target acquisition (RSTA) annex to the Air Tasking Order (ATO), as developed through the ISR strategy development process, should detail the parameters of a dynamic re-tasking and the necessary process for executing such a tasking.[390] Simply moving the sensor focus in support of the original tasking, to include moving UAV asset locations, does not constitute "re-tasking" the asset but simply "re-directing" it in accordance with the ATO and the RSTA annex that assigns missions to ISR assets and units. In the case of

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[388] David A. Deptula and James R. Marrs, "Global Distributed ISR Operations: The Changing Face of Warfare," *Joint Forces Quarterly (54)*, 3rd Quarter (2009): 114.

[389] *Theater ISR CONOPS*, 24.

[390] AFDD 2–9, 15.

“redirecting” an asset, CAOC approval is not required and supported units or even the ISR unit/asset itself may make such a decision when operating in a direct support role.[391]

Unfortunately, even with the ability to redirect sensors during direct support missions, the overall *ad hoc*/dynamic re-tasking process is excessively over-centralized and unnecessarily slow in responding.[392] The problem stems from the fact that such decisions are the responsibility of the Senior Intelligence Duty Officer (SIDO) who makes recommendations to the Chief of Combat Operations at the CAOC for ISR asset employment. Due to the level of detailed planning and target vetting that is required to build the initial collection decks, the SIDO is often reluctant to shift ISR during execution.[393] The SIDO typically lacks the intimate familiarization required to understand the day’s collection requirements and the operations to be conducted because there is only one SIDO at the CAOC who is responsible for managing the ISR constellation for Iraq, Afghanistan, and the Horn of Africa.[394]

Lacking the ability to observe all three theaters to the requisite level of detail demands that authority for managing ISR execution decisions be delegated down to a more appropriate level. In particular, ISR units and their supported customers should have the ability to make common-sense decisions requiring collection deck modifications and the movement of assets to improve collection capabilities.[395] While this ability should be limited to modifying targets within the intent of the designated mission (allowing units to replace old targets with new targets), the CAOC (via the SIDO) will still need to retain visibility over the employment of ISR in order to pre-empt potential ATO changes.[396]

391 *Theater ISR CONOPS,* 24.

392 Ibid.

393 Cheater, “The War Over Warrior,” 19.

394 Ibid., 21.

395 *Theater ISR CONOPS,* 24.

396 Ibid.

Of particular concern are any new requirements that are developed by units not already supported by the ATO. In such a case, the requirement will need to proceed through the standard approval channels but in a manner much more aligned with the short-notice nature of *ad hoc* requirements. Additionally, the SIDO must be made aware of any change that will impact the collection of a higher priority tasking, deny support to another unit, or extend the ISR mission in such a way that it threatens crew duty days, maintenance timelines, or the next ATO day's missions.[397]

1. Maintaining Synergy During Execution

Providing experienced ISR planners down to the BCT level, the level at which most operations will be planned and supported during COIN operations, and developing consistency within the asset tasking process through the "peanut butter spread" of FMV assets and the layering of other ISR platforms will permit detailed and well-integrated ISR planning. Prioritizing ISR support based upon unit or operation further elicits trust in the ability of the CFACC to meet supported commander needs. Careful pre-planning and allocation of resources, however, cannot substitute for the ability to bring the necessary assets to bear at the place and time they are required, to include those short notice, fleeting target situations that dominate the COIN fight.

High value individuals are often targeted over a period days, weeks, or months in which the case against them is developed, positive identification is determined, and a "trigger" is established for precisely locating them in the mass of urban population (such as the use of a monitored cell phone, identification by a HUMINT asset, or possibly observation by a coalition scout/sniper team). Unfortunately, coalition forces rarely control when the "trigger" will be activated and thus must maintain the ability to react momentarily to any number of triggers that could be activated for numerous high value individuals (HVIs) being tracked at the same time. To dedicate ISR assets to each of these potential trigger events with no clear predictive ability as to when they will become a factor would rapidly drain resources and leave assets underutilized. Similarly, the

[397] *Theater ISR CONOPS*, 24.

ability to mass ISR in support of a troops-in-contact (TIC) situation cannot be realistically accomplished with "on-call" ISR assets. Instead, the execution of these and other such fleeting opportunities demands the ability to *pull* assets when necessary.

Such authority should be delegated to the lowest, reasonable level which can be held accountable for the impact such decisions are likely to create. If a commander is not responsible for one of the units to be impacted by a decision, this commander is too low to be delegated such authorities. Higher headquarters concerns for the misuse, or rather underutilization, of assets is valid and the limited number of such resources requires that theater level assets be managed by a control element with theater-wide awareness. Given this understanding, the requesting process should be made no more complicated than necessary.

2. Immediate Request Priorities

For immediate requests, each request should be assigned a priority based on a very limited evaluation of the requirement based upon the tactical situation.[398] In many cases, the presence of an ISR asset may determine whether a mission can be launched or not. For example, lacking the ability to confirm the identity of an HVI and the absence of innocent bystanders has terminated many missions before they could be fully considered. On the other hand, the ability to provide additional over watch support or to allow commanders located at rear TOCs to observe actions on the objective are nice to have additions but do not impact the execution of the mission. ISR personnel must be realistic and honest about what their requirements are and appreciate the impact such requests will have on ISR support theater-wide. Such considerations will be used to determine the priority of any immediate ISR requests. For the purposes of this discussion, immediate ISR requests are those requests that must be fulfilled within the next one to two hours and therefore require the re-tasking of ISR assets that are already on-station or within a few minutes of launch. The specific timelines associated with "immediate" requirements will vary from event to event. (For comparison, an *ad hoc* request is simply one that occurs

[398] JP 3–09.3, III-28.

inside the 72 hour air tasking order cycle and could therefore be planned and executed by assets that will not launch for another 24 hours. *Ad hoc* taskings are simply changes that occurred after ATO publication, approximately six hours prior to the start of the ATO day, and do not imply a specific urgency.) An immediate tasking may be prioritized as Alpha, Bravo, or Charlie but may also include the caveat "no exploitation required" which may improve the likelihood of the request being improved. These terms are proposed based upon JP 3–09.3 procedures.

a. Alpha—Impact to Plan of Action

Collection of the requested target is required for mission execution. Failure to collect the information will result in the mission being aborted and/or a threat to coalition lives. The Alpha designation supersedes all other categories of mission priority.[399] Such a request is common with regards to the need for full-motion video support during a TIC in order to locate enemy force positions and activities and to provide over watch of friendly forces as they either pursue their attackers or disengage to evacuate casualties. In the event of a short notice raid, imagery support may be required to identify defensive fighting positions at the objective, obstacles along the route of travel, and entry points for the assault team.

b. Bravo—Support to Plan of Action

Collection of the requested target is necessary to support mission objectives.[400] Bravo designations will likely include "over watch" type missions that provide force protection to engaged forces but may not directly impact the mission target itself. Such requests represent beneficial support to the mission but are not "mission critical."[401] These requests often arise when there may already be alternatives to collection such as the presence of targeting pod equipped fighters that can provide the same over watch capability as an FMV asset.

[399] JP 3–09.3, III-28.

[400] Ibid.

[401] Cheater, "The War Over Warrior," 39.

Requests for updated imagery once a mission has already been planned using previously collected (and therefore "dated") imagery may also be considered Bravo level support. Although more current imagery can certainly have impacts on mission execution, since prior planning was already made possible by earlier or archived data, alternate courses of action have likely also been drawn up. Therefore, imagery support would help to alleviate tactical decisions on the objective but the absence of such imagery would not *prevent* the execution of the mission.

c. Charlie—Preparation for Near-term Action

Collection of targets in this category may be necessary for near term action but lack of sufficient detail precludes committing operational forces against such targets. Generally, targets with Charlie designations will have no impact on coalition operations and only serve to prepare for future operations. The collection of these targets could prove invaluable in the preparation of the future mission, however, because such operations may be triggered on short notice. Should this target not be collected, it could become a short notice priority Alpha or Bravo target when the mission is triggered. Such targets likely supersede requirements for targets to be collected in support of operations with known start dates that can be collected at a later time. Often, these requests will be made with the caveat "non-interference basis" (NIB) indicating that the collection would be useful but should not be tasked if it will interfere with other targets. As ISR sorties are often planned in such a way as to provide some flexibility, there are often a number of unused collection opportunities that can still be achieved without adversely affecting the collection deck. A Charlie priority, NIB request would very likely then be collected. (Presently, little effort is made to fill these available collection opportunities because the ISARC, which would be the most likely tasking organization in this case, is simply overwhelmed with monitoring all three theaters. A forward deployed ISARC, therefore, could then begin prioritizing additional collection requests among those that did not make the "cut line" to be included in the original collection deck, to maximize the available collection opportunities.)

As an example, as an HVI is developed for targeting, a number of safe houses or places of known occupancy are identified (place of business, family homes, mosques, etc.) Requesting imagery of these locations will allow for pre-planning of actions against those objectives should the HVI trigger occur at those locations. If there is no indication that the trigger event will occur in the near term, such imagery may be collected through standard or *ad hoc* requests. Denying a request for immediate tasking may result in an Alpha requirement being submitted to allow for quick planning by team leaders when the trigger event occurs at a previously identified location.

d. No Exploitation Required—(NER)

Tasking ISR collection is not limited solely by the capabilities of the sensor or the platform carrying the sensor. In fact, much of what limits the collection of targets is the ability of analysts to exploit the collected information. The U.S. intelligence community has a far great capability to collect raw information than its capacity to exploit that data. For this reason, a collection deck on a highly capable asset, such as the Global Hawk, may be intentionally limited well below its advertised deck in order to allow imagery analysts located at the DGS to process all of the data in a timely fashion. If the imagery analysts at the supported unit are willing to take on the workload themselves, more images can be added to the collection deck, significantly increasing its capabilities.

For this reason, all collection requirements should be annotated with whether or not the requesting unit can provide exploitation of the data. As the request is forwarded through the chain of command, higher echelons may also determine that they can process the data for their subordinates if the requesting unit is unable to do so for themselves. Some data, such as highly complex imagery products or rare dialects must be exploited by reach back agencies. For immediate taskings, the ability of the supported unit to analyze their own products can be an important consideration when approving Bravo or Charlie prioritized requests.

3. Level of Approval

When determining whether immediate requests should be fulfilled or not, care should be taken in elevating the decision only as high as necessary. Horizontal communications should be emphasized to allow decisions to be fully informed and to prevent redundant communications. In the case of the oil smugglers described in Chapter I, the requesting BCT was already in contact with the ISRMC and had been informed of the U-2's ability to support the mission. Unfortunately, vertical communications all the way up to the CAOC eventually resulted in the CAOC contacting the ISRMC again to determine U-2 support for the BCT. Rather than using e-mail, which is optimized for the transfer of discrete packets of information and therefore favors vertical communication, chat rooms, optimized for "discussions," should be leveraged to provide a more comprehensive awareness of ISR requirements and capabilities.

The means by which ISR gain and loss assessments are conducted may vary from organization to organization but Figure 43, Sample ISR Gain/Lost Assessment Tree provides a generic example of how such decisions should be considered. Once a conflict has been identified with regards to the approved collection deck (illustrated by the bottom right container in Figure 43), the decision must be made at the next level above the point of conflict. The following guidance will help to clarify where decisions should be made.

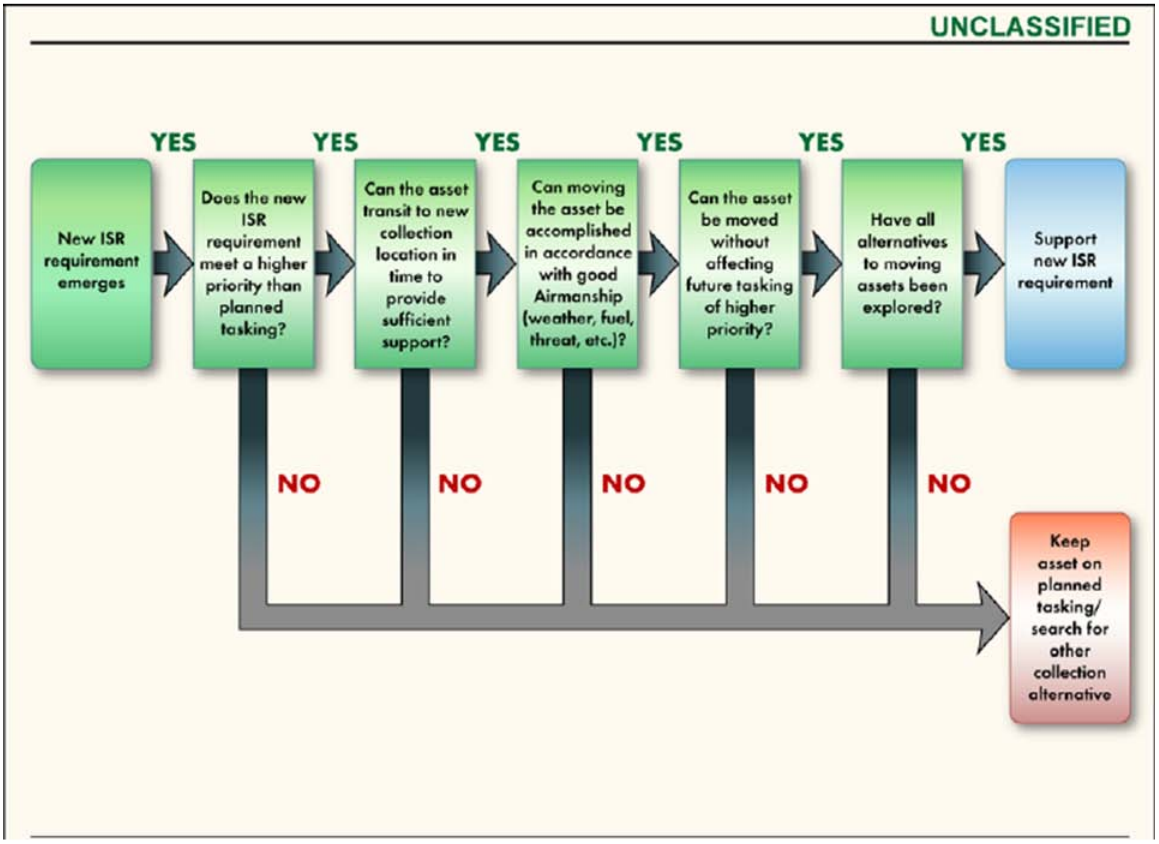

Figure 43. Sample ISR Gain/Lost Assessment Tree[402]

a. Same BCT, BCT Makes the Call

In the event that an ISR platform determines that it can fulfill a collection request but only at the expense of another target on the requesting BCT's collection deck, the BCT collection manager should be able to make this decision without forwarding the request up channel. This allows for the easiest transition between targets that have been overcome by events and new targets that have been developed since the publication of the ATO. Furthermore, in dynamic situations in which actions are occurring or will begin shortly, this process allows the BCT to take responsibility for their ISR decisions by dropping lesser prioritized targets. This requires that the joint BCT ISR team on the TOC

[402] From: *Theater ISR CONOPS*, 25.

floor has a clear understanding of the collection priorities and interact with the Chief of Operations (CHOPS) who monitors the TOC activity and makes decisions based upon the BCT commander's guidance.

b. Between BCTs, Division Makes the Call

When it has been determined that a new collection request can only be satisfied if collections for another BCT, belonging to the same Division, are modified or dropped, the Division that commands both BCTs will be the senior decision maker. Again, this will require a careful understanding of the Division commander's priorities for supporting the BCT operations and the ability to determine the specific priority of each of the collection requests submitted based upon the associated justification statements and supported operations.

c. Between Divisions, Corps Makes the Call

Collection requests that will impact targets belonging to another Division or BCTs within a separate Division will demand the attention of the Corps collection management team. At this level, the Corps commander's priorities will be considered and the availability of "non-aligned" ISR (which may have already been held in reserve to meet such challenges) to fulfill the need will be determined. With a forward ISARC, this decision should be made by the ISR Operations Duty Officer in the ISARC based on clear guidance provided by the Corps collection management team and the Corps CHOPS's understanding of the current situation.

d. Impacts Crew Rest or Aircraft Maintenance, CAOC Makes the Call

Regardless of what supported units may be impacted, consideration of aircraft and crew limitations must also be monitored. Even in the event in which a BCT will only be impacting its own collection deck, if the request will force the asset to extend its flight time, delay its landing, and/or strain the crew duty day, the CAOC must be involved in the decision. For example, a GH may support several different BCTs in a single mission. If the last BCT to be supported in the mission makes a request for an

immediate collection that will force the GH to change course and extend its flight time beyond what was planned for in the ATO, the request will obviously not impact any other BCT collection but it may delay necessary maintenance for the GH, preventing it from being used on the next ATO day. Such situations may require that the ATO for the next day be resourced with different assets or go unsupported altogether. This of course will have implications far beyond the simple swapping of targets on the BCT collection deck. It is important to note, however, that the CAOC should only monitor all requests and not be consulted on all requests. This will serve to limit the delay in supporting new collections by not requiring that requests be forwarded completely up the chain of command.

4. Processes

When attempting to change targets on a collection deck that is already being supported, the request should be made directly to the supporting unit. The request, however, must be coordinated so that all other elements have the ability to monitor, and complications can be quickly resolved without additional back briefs or repeated requests. It may be necessary, however, to cut and paste chat conversations from rooms in which the collector was working directly with the supported unit into a chat room that has more universal visibility.

Requests for dynamic re-tasking such that require assets not already supporting the requesting unit should be forwarded to the ISARC via the fastest means available. Ideally, this transmission means should provide visibility to all intermediate headquarters elements as well as to the CAOC to ensure the availability of other assets is considered. This process would replicate the Joint Air Request Net (JARN) used by the CAS community. In such a process, the collection manager and/or the ISRLO at each level considers the commander's intent for the employment of ISR and priority operations and evaluates the availability of organic or other aligned assets (to include non-traditional ISR) to fulfill the request. In the event that intermediate headquarters are unable to fulfill the request but acknowledge that the request is in line with the commander's intent for

ISR and priority of operations, they do not need to provide further input to the process. "Silence by intermediate headquarters implies consent to the request."[403]

a. Request Formats

Making requests for *ad hoc* and immediate requests demands the ability to transmit information to all interested parties simultaneously. Not only must horizontal coordination be permitted between the requestor and the supporting ISR element, but decision makers higher in the chain of command may also need visibility. Such oversight is required to ensure that requests are being filled by the best available asset, are not violating the commander's intent, and that the request will not impact the availability of the asset in the future to support other requirements. In the CAS community, such requests are transmitted via radio (See Figure 44, Close Air Support [CAS] Immediate Request Process); however, in the ISR community, internet relay chat is likely to be a better conduit.

[403] JP 3–09.3, III-28.

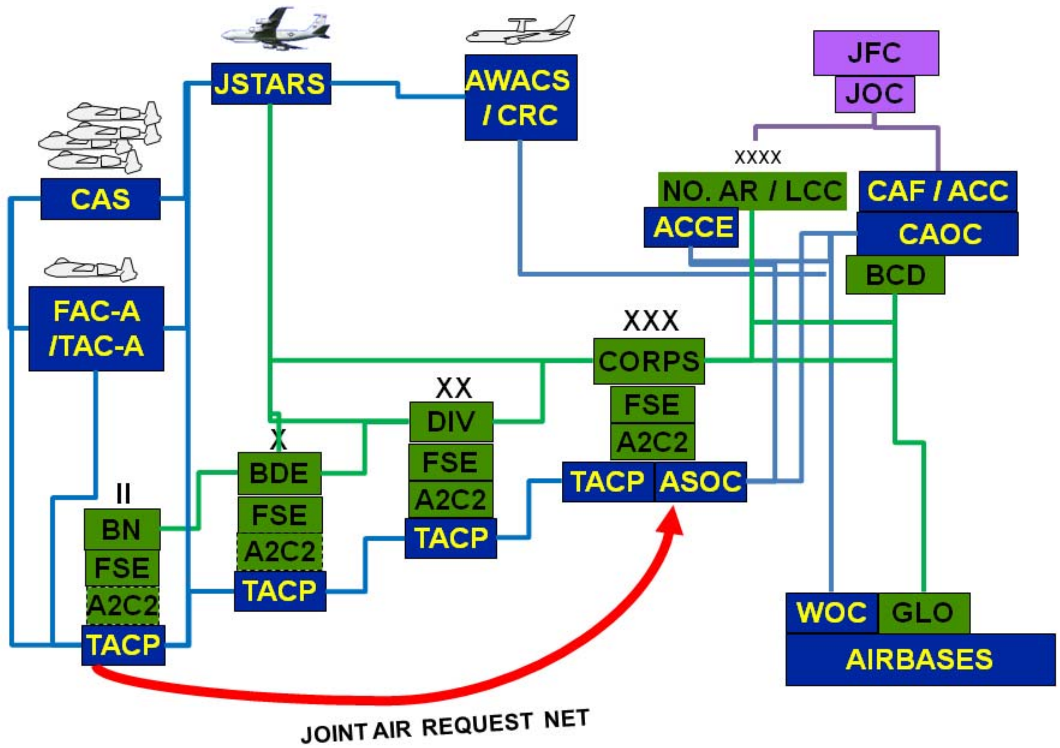

Figure 44. Close Air Support (CAS) Immediate Request Process[404]

(1) Chat. Chat represents the ideal function for submitting and coordinating ISR support as it provides horizontal linkages between all key nodes as well as universal visibility for all command elements with regards to changes in the collection requests. "Private" windows can be used for direct communication between supporting and supported units and should any discussions in that window require the attention of other elements, can easily be copied and pasted into the appropriate window.

Most importantly, there needs to be one chat window dedicated to *ad hoc*/immediate requests. This will minimize the number of chat rooms that must be monitored by all interested parties and allow for communal problem solving in the event that collection is unavailable or would create unnecessary complications for other units. For example, should a unit request an FMV asset but be denied the request due to a lack

[404] After: JP 3–09.3, II-6.

of available assets or high priority requirements, the ISRMC supporting a GH mission may suggest using the "rapid revisit" capability of the GH to meet their needs based on the description of their requirement. It may not be an ideal substitution but it may still provide the necessary information. Similarly, collection managers may request support but not be aware of a specific capability to fulfill that request. A single chat room for such requests may allow ISR experts at different echelons or organizations to offer new capabilities or to request clarification of the need to determine the possibility of fulfilling the request by other, unconsidered assets.

(2) ISR Coordination Net. Less ideally, requests can be submitted over a radio channel that replicates the CAS Joint Air Request Net (JARN). Within the CAS realm, JARN is an effective means of transmission because all nodes of command within the CAS network are able to monitor and transmit via radio.[405] Collection management nodes, however, typically do not have radio operations capabilities. In many instances, the collection manager would have to pass the request through the supporting JTAC to transmit via radio. The request would then likely be received by an airborne asset possessing chat capabilities (such as the RJ or JSTARS) or by way of the pilot back to an ISR node that does have chat (as in the case of the U-2 and DCGS). This, of course, is an unnecessary delay in most cases when chat is more likely to be available.

The exceptions that make the use of an ISR Coordination Net (ICN) appealing are those situations in which ISR support is required for personnel geographically separated from their collection management support and lack secure Internet access. A platoon located at a forward outpost may request JSTARS monitoring of the surrounding roads or rely upon RJ SIGINT support to provide warning of a potential attack. Unable to submit their requests via a collection manager, they may be able to use their supporting JTAC to make their request for them. In such a case, the

[405] JP 3–09.3, II-20.

delays incurred by repeating the request via chat may be unavoidable to ensure such support is provided. (See Figure 45, Proposed ISR Immediate Request Process [Including Both ISR Chat and ICN].)

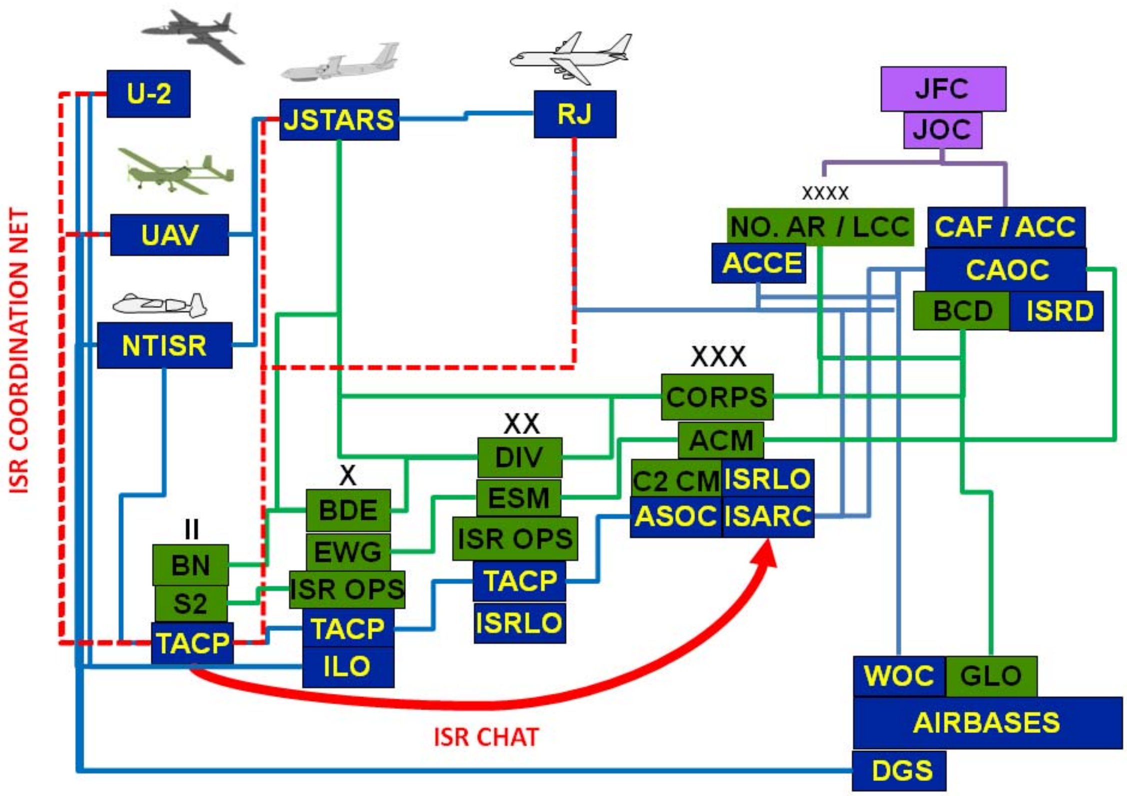

Figure 45. Proposed ISR Immediate Request Process (Including Both ISR Chat and ICN)[406]

b. JTAC-ILT Interaction and "Terminal Control"

(1) Roles and Responsibilities. The ILT would provide invaluable situational awareness and continuity of operations by being forward located with the supported customer. While reach back nodes can provide unmatched analytical processing and capability, their geographic separation from the supported unit naturally inhibits their ability to understand the flow of operations and the context for the decisions

406 After: JP 3–09.3, II-6.

being made. The ILT will provide the bridge between these efforts, the efficiency of the reach back units and the effectiveness of the forward elements, by orchestrating and integrating the overall processing, exploitation, and dissemination effort.[407]

In the proposed concept of operations, the ILT provides the capability for tactical decision makers to review ISR inputs and assess situational developments to determine if "trigger events" had occurred necessitating a response, or if different tactics or actions were required to deal with the changing situation. ILT personnel can confer with operations personnel, rewinding full motion video or ground moving target indications to track movements of potential targets, to evaluate the development of a situation, or simply to gain clarity of events. Simultaneously, reach back elements could continue to monitor the ISR feeds and notify forward personnel of any significant updates.[408]

The ability to maintain decentralized control of airborne ISR assets requires not only operations-intelligence synergy to point the sensors at targets for which the unit is prepared to action, but the ability to do so safely. A balance must be struck between preventing mid-air collisions with providing all supporting assets with freedom of movement. A common Army practice of establishing unnecessarily restrictive operating areas that force other support elements to "stand-off" from the target area should be avoided whenever possible.[409] This can only be accomplished through careful coordination with air planners and airspace control elements.[410]

The ALO and the JTAC in the BCT provide the best capability for planning and deconflicting all airborne assets operating in support of the BCT. Furthermore, the ALO/JTAC may have access to additional resources that may be useful in the conduct of ISR operations. Fighters with targeting pods are often substituted for full motion video assets yet have limited connectivity with ISR personnel who are often restricted to secure phone or chat capabilities. The JTAC, however, is able to

[407] Flynn, Juergens, and Cantrell, "Employing ISR," 59.

[408] Ibid..

[409] Cheater, "The War Over Warrior," 56.

[410] Flynn, Juergens, and Cantrell, "Employing ISR," 61.

communicate with all airborne assets (to include ISR assets) via radio which may be the only connectivity to certain assets (fighters in particular). Coordination between the ILT and the JTAC is necessary to eliminate the redundant employment of ISR and CAS assets with regards to similar target effects.[411]

(2) Kinetic Effects and hand-off. An increasing number of ISR platforms are being armed to conduct kinetic operations in order to minimize the "sensor to shooter" timeline. This duality of employment requires that ISR personnel work closely with joint terminal attack controllers to identify decision points at which the asset will proceed from an ISR tasking to a kinetic employment role. At such time, the asset must be "positively" handed off to the JTAC for terminal control of the kinetic employment.[412] Positive hand off indicates that all players are aware of who is responsible for redirecting sensors, authorizing the employment of weapons, and providing specific mission details. When using chat, for example, typing, "DS to JTAC"[413] indicates for the ILT, the JTAC, and the UAV operator, the UAV is now in direct support (DS) to the JTAC who will provide further directions for employment. This typed message should be acknowledged by the JTAC and the UAV operator to ensure there are no miscommunications. Simply typing "UAV aff" and "JTAC aff" provides this understanding through the common abbreviation for "affirmative." The same process should be used when the UAV is returned to the ILT for coordination to prevent inadvertent redirection of the sensor by the JTAC or a failure to respond to requests for the UAV.

D. GETTING INTELLIGENCE TO THE CUSTOMER

Information must be available to the supported unit when the decision is to be made or it is of no value. Additionally, information that is requested by one agency may be of value or provide invaluable context to another agency and therefore must not be unnecessarily contained. This need to move information through the force along specific

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[411] Cheater, "The War Over Warrior," 24.

[412] Ibid., 23.

[413] Ibid., 31.

transmission paths or channels to enhance speed of dissemination while simultaneously making the information available to a wide spectrum of customers represents a key challenge to ISR planners and all elements of the ISR constellation.[414] Intelligence data must be timely, accurate and relevant and provided to analysts at the lowest possible level for immediate implementation. Furthermore, ISR data should be disseminated throughout the force to allow coordination of efforts among other elements or echelons.[415]

1. Short Term Analysis (Mission Execution in Progress)

During execution, ISR support to operations is often limited to a "confirm or deny presence of" type mentality in which raw, unexploited imagery or video feed may suffice. Such "products," require little more than a decision maker's ability to observe a limited number of key indicators that are likely to be easily interpretable. This has been the key to the popularity of FMV feeds. Systems such as the One System Remote Video Terminal (OSRVT) or Remote Optical Video Enhanced Receiver (ROVER)[416] can receive FMV feeds from manned and unmanned ISR platforms and fighter aircraft equipped with targeting pods and can display the video on laptops or screens throughout the TOC.

Similarly, the Global Hawk community has developed the capability to transmit unexploited imagery to a SIPRnet website called the Joint Targeting Attack and Assessment Capability (JTAAC) within three to six minutes of the image being taken by the aircraft. By receiving the image in less than 10 minutes, rather than the typical 25

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414 FMI 2–01, 5–2.

415 AFDD 2–3, 17.

416 "Remote Video Terminal ROVER III / OSRVT: Remote Video Terminal for One System GCS," Defense Update International On-line Magazine, http://defense-update.com/products/r/rover.htm, (accessed August 12, 2009).

minutes or more required for processing, exploitation and dissemination, ground commanders can execute their next tactical decision and maintain operational momentum.[417]

2. Long Term Analysis (Joint Intelligence Preparation of the Battlespace)

Although ISR will be used more extensively than in conventional operations to support COIN endeavors in real time, ISR products will still require analytical processing as well. Even products that are provided directly to decision makers, such as raw imagery from Global Hawk or full motion video feeds from the Predator may simultaneously be transferred to reach-back analytical shops for more detailed processing and integration into comprehensive analytical products. For this reason, all intelligence should be disseminated to the appropriate databases as soon as possible to leverage the greater analytical capacity of dedicated analysis shops both organic to the supported unit and geographically separated.[418]

Reach-back assistance provides unique advantages compared to organic analytical capabilities. Most notably, time-intensive and systems intensive products may be difficult to produce locally when more time sensitive issues draw away analyst attentions or when limited bandwidth or computer processing prevent using technologically demanding processes. Additionally, reach back agencies may have more experience in dealing with certain ISR capabilities and systems than can be reasonably provided by training or temporary liaison to forward elements.[419] Lastly, with regards to presence of an "occupying force," the use of reach back nodes can reduce the forward footprint of coalition forces, thereby reducing the "intrusiveness" of foreign personnel into the counter insurgency environment.[420]

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[417] Brandon E. Baker, "Increasing the Combat Effectiveness of the RQ-4," *USAF Weapons Review*, Summer 2008: 40.

[418] *Theater ISR CONOPS*, 22.

[419] FM 3–24, 131.

[420] AFDD 2–3, 34.

Naturally, organic analysts provide necessary understanding of current operations and the local environment along with analytical continuity. Given that it can take several months to develop a comprehensive understanding of the operational environment, the organic analysis section must be leveraged for their on-site focus.[421] Horizontal linkages and habitual relationships over time will optimize the employment of both organic and reach back analytical capacity.

3. Archival and Retrieval of ISR Reports

In counterinsurgency campaigns, changes over time represent key indicators of success. Furthermore, changes in patterns of life can indicate the presence of hostile forces or threats to coalition forces. Therefore, while ISR plays an important role in the real time coordination of operations, the ability to study a target or area of operations over time represents an equally important aspect of ISR. Detailed target studies are often augmented with archived data to provide historical context, to highlight otherwise unexceptional changes, and to develop familiarity with local activity.

Databases must be easily navigated and provide the ability to search in a multitude of ways. It is often difficult to predict what exactly will be important when information is initially collected and resources may be used again and again for different products. The Air Force has developed a number of such databases for storing and easily retrieving imagery and full motion video based upon date of collection, location (given in either geocoordinates or military grid reference system) and key word searches. Furthermore, imagery has been made available via low-band width portals such as the Imagery Access Solutions (IAS) specifically designed for those units whose forward locations inhibit downloading large file sizes.[422] The ability to stream FMV footage over SIPRnet and to pull-up archived FMV footage has also improved analyst understanding of the supported area of operation.

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[421] FM 3–24, 131.

[422] Deptula and Marrs, “Global Distributed ISR Operations,” 113.

E. CONCLUSION

Returning to the case of the black market oil sales, this coherent, COIN-focused ISR structure can be demonstrated to more effectively deal with the tactical problems of 2–82 BCT. This is, of course, a hypothetical evaluation used to highlight the capabilities of the process, not to provide "proof" of its superiority over other potential changes to the process.

1. 12 June 2007—Chasing Black Marketers

The effects working group determines that the illicit sale of oil by black market groups within 2–82 BCT's Area of Operation represents a significant threat to the counterinsurgency campaign for a number of reasons. The local population is understandably reluctant to provide information on the oil smugglers and sellers as they represent the only access to a highly valuable product. The Government of Iraq, however, lacks the capacity to provide this resource largely because its pipelines are being sabotaged and siphoned off to support insurgent operations. Therefore, to improve government capacity to support the local citizens of the AO, the black market groups need to be eliminated while Government of Iraq (GOI) access points are improved.

Black market groups signify the GOI's inability to enforce law and order because they are able to operate freely within the population. This in turn promotes additional challenges to GOI rule of law and encourages support for the insurgency, even if only passively. Once innocent civilians allow illegal activities to occur within their neighborhood, they are more easily influenced by threats of government persecution in the event that they choose to turn against the insurgents. This allows them to be extorted into more active support of the insurgency. For this reason, shutting down the black market oil sales is essential to providing security for the local populace.

Though intelligence has yet to confirm the direct tie between black market oil sales and the financing of insurgent activity, there are sufficient indicators to suggest such a relationship. Since most criminal activity in the area of operations (AO) is managed by the local militia in order to ensure the militia's role in governing the population, any

illicit activity can be assumed to be in some way related to the activities of the insurgents. To this end, disrupting the illegal sale of oil in the AO contributes directly to the offensive COIN strategy.

The collection manager and the BCT ISRLO begin to work directly with the EWG members to establish a collection plan for finding the oil black marketers, tracking them back to their safe house, and supporting a raid to capture the black marketers and to secure their oil surplus. To begin with, the ISRLO works with the BCT to determine the nature of a black market oil operation and provides these descriptions to the MND-B DART element at Distributed Ground Station One (DGS-1). Next, the ISRLO and collection manager (CM) begin constructing long range ISR plans and formulating a template for use in support of an immediate raid on the safe house.

The DART analysts review the BCT description of illegal oil sales events and then begin to review imagery and FMV archives for the area in question. Previously, imagery and FMV had been tasked with searching for IEDs or other insurgent activities but never specifically tasked with searching for oil smugglers or sales stations. Additionally, because none of the young Airmen who analyzed the imagery or video footage knew what such an operation looked like, they would not have been able to report it even if they had been tasked with the requirement. After a detailed review of the archived data, the DART is able to produce a series of “story boards” using both images and video clips to identify likely illicit sales operations. In so doing, the DART analysts working in conjunction with BCT analysts are able to identify common themes among the operations to include favored operating locations and a particular white pick-up truck that consistently appears in many of the scenes.

Based on collection requests submitted by the 2–82 collection manager, a multi-spectral imagery pass is made of the pipelines in vicinity of 2–82’s AO. Specialized analysis by the DART located at the National Air and Space Intelligence Center (NASIC) which provides longer-term analysis of highly specialized intelligence products, reveals several likely points along the pipeline where smugglers may be tapping into the pipeline to disrupt GOI operations and to secure their own sources of oil. While 2–82 BCT plans to dispatch patrols to watch over these areas and support elements to repair the damage to

the pipelines, NASIC conducts "forensic analysis" of archived GMTI data to identify a number of "rat lines" leading from the suspect points along the pipeline to a limited number of neighborhoods within 2–82's AO. Although the precise locations of where this oil is smuggled remains undetermined, it provides 2–82 with a more focused region for increased patrolling and the potential allocation of FMV assets.

Patrols subordinate to 2–82 BCT now begin aggressive patrolling of both the common sales points with a description of the commonly associated pick-up truck and of the neighborhoods where the "rat lines" terminated. Additional imagery requests were submitted searching for the likely storage tanks in the suspect neighborhoods in order to further narrow the search area. The identification of the black marketers and their safe house, however, was determined by HUMINT, augmented by the more specific questions asked based on the previously provided intelligence. Once a known location for the black marketers had been established, the collection manager and the ISRLO transitioned to providing immediate support for the raid which was scheduled to occur in the next 12 hours.

Due to the shortened time line, an *ad hoc* request was submitted for ISR support using the DD Form 1972.1 with the graphical mission type order (MTO) slides embedded in the request. Specifically, 2–82 CM requested imagery of the target house to include 360 degree coverage highlighting entry points in the compound's external wall and into the buildings themselves. Imagery was also requested for the immediate area to search for potential ambush points, obstacles to the approach, and indications of defensive IED emplacements. Division SIGINT support was requested to provide early warning of communications between spotters and either the targeted black marketers or potential ambushers along the assault team's route of travel. Although 2–82 had its organic FMV capability, a request was issued for a higher headquarters UAV based on improved capabilities and the requirements for a low signature surveillance capability.

The Division CM was able to pull archived imagery and provide the 360 degree evaluation of the compound to include the annotation of potential obstacles and all entry points. Though some of the images were months old, the overall evaluation appeared to be sufficient to meet the assault team's needs. An *ad hoc* request was forwarded for the

night's U-2 mission to provide radar imagery with the provision that the imagery would be exploited by the Division's analysts, thus eliminating the need for the DGS to add the image to their exploitation deck. SIGINT support was approved and coordinated to communicate directly with the assault team leader rather than be funneled through the BCT. The Division determined that its own aligned UAVs were already tasked against higher priorities (given that 2–82's organic UAV was available) but suggested that CAS that was also being requested to support the operation could be used to provide FMV coverage as well. The FMV request was still forwarded to Corps, however, to see if any non-aligned FMV assets could be made available.

The Corps CM determined that additional CAS sorties were not required for this operation based on 2–82's assessment of the threat. Since the compound was located outside of a known insurgent stronghold (such as Sadr City until 2008), there was little potential for a sustained troops in contact situation requiring CAS. Should the need arise, however, MND-B had a number of CAS sorties already supporting other operations that could be redirected to provide immediate CAS support. Additionally, there were no non-aligned FMV assets available so 2–82 would have to proceed with their organic support. The radar imagery request was approved based on coordination with DGS-1 which determined that based on the "no exploitation required" caveat, the aircraft could easily image the target area without impacting any other collection requirement.

As tasked by the MTO, the BCT CGS operator began to conduct his own forensic analysis of the night's GMTI mission to determine how many vehicles may have arrived at and/or departed from the HVI location. He also established a brief "pattern of life" regarding the amount of traffic on the streets and any indications of road blocks in the area. Traffic after curfew was actually observed travelling from one of the suspected illicit oil sales points back to the targeted neighborhood and after that, no other vehicles were observed entering or leaving the immediate area. The CGS operator also coordinated with the JSTARS crew, indicating the location of the target house and requesting their support in monitoring the situation for "squirters." The mission had already been approved and because of the DD Form 1972.1 and the MTO, the mission crew was prepared to support the mission.

As in the June 2007 example, the raid on the black marketers' safe house results in the identification of the financier to whom all funds were transferred. Since this particular individual was already on the BCT's HVI list, CHOPS decides that he should be "rolled up" that night to prevent him from being alerted to the capture of his subordinates. Unfortunately, while the black marketers had been to the financier's house several times, they did not know the specific address. They could only provide a description of the house and its property and a general location, within a neighborhood on the periphery of an insurgent stronghold.

To more precisely identify the HVI's location, the BCT CM requests immediate support in the form of SIGINT location and FMV coverage. Identifying that the HVI lives in a neighborhood that is heavily aligned with the insurgents, the organic UAV coverage is determined to be a risk for compromise and therefore bolsters the request for more capable assets. The Division CM determines that current UAV taskings will allow a Division aligned UAV to be temporarily redirected to support the mission. Additionally, a SIGINT asset tasked to support another BCT is made available when the BCT has to stand down its quick reaction force due to a lack of mission essential equipment. Lastly, the BCT and Division ALO coordinate to transfer one CAS sortie from support to a BCT's whose mission has already successfully been accomplished to 2–82's requirement.

Using the same MTO template developed by the Effects Working Group (EWG) to manage the initial raid, the BCT ISRLO contacts the ISARC and requests an immediate imagery pass to look for additional obstacles, potential ambush sites, or IED activity in the vicinity of the new target house. The ISARC determines that the U-2 that provided the earlier imagery would still be the best option for support and works with the DGS to determine impacts to the collection deck. As it turns out, a BCT in another Division would be impacted if the U-2 is required to divert to take the image. The ISARC, coordinating with the Corps CHOPS and Corps Intelligence Division (C2), reviews the MTO of the BCT to be impacted by 2–82's request. Coordinating with the affected BCT CM, it is determined that the image is not of immediate need and can be slipped to a later mission. The diversion of the U-2, however, will extend the flight of the

U-2 by 30 minutes and so the MNC-I ISARC contacts the ISARC at the CAOC to receive final approval. Despite the extended flight time, the CAOC approves the request and the U-2 immediately begins re-routing to the target area.

With the SIGINT asset and UAV in place, the on-scene commander at the black marketers' safe house has them call the HVI's cell phone. The SIGINT asset is able to refine the location of the HVI's residence to within a few buildings at which point, the Division aligned UAV begins searching the area for a building matching the description provided by the captured black marketers. The CAS fighters also arrive on station and use their targeting pods to watch for "squirter" vehicles in the event that the HVI becomes spooked and decides to flee the area. The pilots are also able to begin familiarizing themselves with the area and coordinate with the JTAC to establish common reference points should the need to employ weapons arise. The Division imagery analysts use the refined target location to better focus their exploitation of the radar imagery and are able to identify a number of roads that appear to have had recent construction activity, potentially indicating IED locations. The assault team begins to plan their route, avoiding those specific roads.

Also continuing operations from the MTO template, the BCT CGS operator conducts a second round of forensic analysis of the night's GMTI mission focused on the new target location. Resulting from his brief "pattern of life" analysis, one such road block is identified based upon the slowing of traffic in the area. Although the road block is determined to belong to an Iraqi Police (IP) unit (based on coordination between the BCT CHOPS and the IP liaison), the decision is made to plan a route around the road block to expedite their travel and to limit the potential for someone (including the IP) to alert the HVI to the mission's approach. The CGS operator coordinates again with the JSTARS crew, indicating the location of the new target house and requesting their support in monitoring the situation for "squirters." The ISARC, able to observe all such requests via chat, confirms that the JSTARS mission crew is cleared to support 2–82 based on tasking priorities.

As the assault team traveled from the safe house to the HVI residence, Division SIGINT support monitored known communications used by the insurgents. The

JSTARS, chatting with the CGS operator and speaking directly with the assault team via radio, maintained watch for any vehicles moving toward the assault team or toward an intercept point along their route of travel. CAS aircraft split their focus between watching the target house and providing a visual sweep ahead of the convoy for suspicious individuals along the route or any indications of a potential IED. Upon arrival at the house, one of the captured black marketers was able to confirm the location and the assault team dismounted to begin the assault.

Whether by observing the arrival of the assault team or through some other form of warning, the HVI attempted to flee from the back of the residence. The UAV was able to maintain "eyes on" the individual and the ISLT in the BCT TOC provided continuous updates to the assault team commander via radio communications. Despite entering another residence two streets from his own, the HVI was captured by the assault team who were able to identify the appropriate house due to a laser marker shining from the circling CAS fighters who themselves had been cued by the JTAC observing the UAV feed monitored by the ISLT.

2. Learning During Execution

This vignette provides an example of how thorough ISR planning can support COIN operations including the development of templates for supporting specific operations and real-time integration for the coordination of ISR and operations assets. Despite initial lack of taskings, the BCT ISR Operations team, led by a designated ISR Mission Effects Coordinator (ISRMEC), was able to adapt to the situation with available resources. Additionally, the ISRMEC was able to leverage a responsive request process including a forward deployed ISARC that could quickly evaluate ISR priorities and provide support on an as needed basis. Having a single element in charge of ISR execution ensures that cross-cue opportunities are recognized, that mission focus is maintained, and that there are no unnecessary delays in decision making due to a requirement to explain a developing situation to someone at a higher echelon responsible for managing multiple other fights. Planning and tasking are essential to success but no

plan survives unencumbered by the realities of the environment, weather, or enemy actions and therefore requires an inherent capability to be modified as necessary.

Changes to planning ISR, tasking ISR assets, and executing ISR operations in coordination with on-going operations as discussed in the past three chapters have to date been made in many instances because of the hard work of select individuals. Unfortunately, lessons need to be re-learned and prior, beneficial decisions are overturned because there is no formalized doctrine to support and guide such efforts. For this reason, the changes described in this thesis should be encapsulated in a joint doctrine publication as discussed in the next chapter.

VI. THE FUTURE OF CLOSE ISR SUPPORT—WHY DOCTRINE IS IMPORTANT

A. INTRODUCTION—THE PERILS OF A “MISSING DOCTRINE”

Counterinsurgency (COIN) is not a new realm for the U.S. military. In fact, the majority of the U.S. military’s combat history has been focused on conducting counterinsurgency operations from conquering the native peoples of North America, to defeating the insurgency in the Philippines (both in the aftermath of the Spanish-American War and as part of Operation ENDURING FREEDOM), to the most notorious example, in fighting the communist guerrillas of Vietnam. The U.S. Air Force, however, has largely ignored the pressing need for a COIN doctrine, downplaying the use of air power in small wars in its professional military education.[423]

The most pressing reason for developing such doctrine is the simple fact that without a coherent doctrine, a military force lacks guidance on how to train, equip, and organize for the effective execution of operations in such conflicts.[424] With an understanding that the U.S. military is likely to encounter further insurgencies in the future[425] and that intentions of avoiding such fights are unrealistic, the U.S. Air Force must embrace its role in COIN operations and develop a coherent, fully developed doctrine for employing in “small wars.” Most notably, the U.S. Air Force should not approach the development of a COIN doctrine as a shift away from its preferred role in air dominance during a conventional fight but simply an inclusion of the roles and responsibilities of air power in COIN operations into its overall concept of air doctrine.[426] Without a specific written reference, manpower, money, and training are unlikely to be sufficiently provided for this ongoing requirement.

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[423] Kenneth Beebee, “The Air Force’s Missing Doctrine: How the U.S. Air Force Ignores Counterinsurgency,” *Air and Space Power Journal*, 27.

[424] Ibid., 28.

[425] Ibid., 27.

[426] Ibid., 28.

A driving factor in the Air Force's resistance to developing such doctrine is the very nature of air power in COIN, as support to ground forces and other government agencies. [427] The premier missions of the Air Force, counter-air, air interdiction, and strategic attack hold little value in a COIN campaign, driving the Air Force to focus only on air lift, Close Air Support (CAS), and Intelligence, Surveillance, and Reconnaissance (ISR) operations.[428] The Air Force largely neglects situations where it serves only in a supporting role[429] a term that, despite its doctrinal validity, has angered many senior U.S. Air Force officers. As has been overheard in the Combined Air and Space Operations Center (CAOC) on many occasions, "the Air Force does not *support* operations, we integrate our operations with those of the land component commander."[430] This is, of course, foolish and not supported by the doctrinally established roles of the Combined Forces Air Component Command (CFACC) in relation to the Combined Forces Land Component Command (CFLCC) in the different theaters of COIN operations.

A COIN doctrine that does not simply attempt to force "major theater warfare" concepts to fit into a smaller size will highlight the effects air and space power can bring to the fight. Understanding these capabilities will in turn clarify the types of people and training needed for air power employment within COIN.[431] It is not enough to simply parrot Army/Marine Corps doctrine and attempt to fill land component short falls with surplus Airmen. Airpower advocates in a COIN environment have specific roles and they require detailed knowledge on those roles to be effective. The Air Force has important contributions to make to the fight beyond being a pool of bodies for Army taskings.

An appreciation for the types of weapons systems required to support COIN operations will influence the procurement process.[432] This will likely require responsive

[427] Beebee, "The Air Force's Missing Doctrine," 28.

[428] Ibid., 30.

[429] Ibid., 28.

[430] Author's personal observation in May and November 2007.

[431] Beebee, "The Air Force's Missing Doctrine," 30.

[432] Ibid., 31.

and low observable assets, to include ISR platforms that will provide high persistence and granularity as well as munitions better suited to the low collateral damage demands of a population-centric COIN strategy. But without a doctrine to serve as the "touch stone" of validity, such requests for resources will largely be ignored in favor of applying conventional forces already in existence to problems for which they were not designed.

Lastly, doctrine influences organizational design, particularly as it regards the close support dictated by COIN. In such an environment, centralized control of assets is unlikely to provide the responsiveness required by supported ground commanders.[433] A carefully constructed doctrine, as it relates to COIN, will be less about dictating a strict organizational construct but rather embrace the flexibility required to evaluate each theater for the appropriate echelons to which liaison officers are assigned, planners are delegated, and where command and control nodes will be most effective. This structure, by its nature, will de-emphasize assigning air power advocates to units based on size but rather focus on the mission requirements of the unit.[434]

Ideally, this thesis should serve as a starting point for understanding the required doctrine and provide a foundation upon which more detailed doctrine can be built. While the Air Force has certainly come a long way in developing Air Force Doctrine Document 2–3, "Irregular Warfare," its broad scope and generalities prohibit a sufficient understanding of air power operations in small wars to influence manning, training, and budgeting as required. Again, instead of replacing U.S. Air Force conventional doctrine with that suited only to COIN, the Air Force and its joint partners must replicate the duality of the air tasking process as reflected in the air tasking order process and its companion close air support process. One is not a substitute for the other and, in many cases, both processes will be used simultaneously. There already exists an extensive ISR doctrine for managing and employing CFACC ISR assets in a major theater war, and this has been significantly improved upon by the *Theater ISR CONOPS* developed by Lt Col Jason Brown and Major Max Pearson. What is now required is a complimentary

[433] Beebee, "The Air Force's Missing Doctrine," 31.

[434] Ibid.

document to Joint Publication 3–09.3 "Joint Tactics, Techniques, and Procedures for Close Air Support," which provides the same level of guidance for Close ISR Support.

B. ORGANIZATION, MANNING, AND EQUIPPING

1. Dynamic Organizational Design

Although the U.S. Army reorganized to prioritize the Brigade Combat Team as its basic fighting unit in 2005 based upon the necessities of counterinsurgency and the small, decentralized adversary forces it was facing in Iraq, there is no reason to assume that this organizational structure will continue to be effective in Iraq in 2010 or in Afghanistan or other theaters of operation. As Les Vadasz, senior vice president of Intel argues, "there's absolutely no reason why an organization that you created two years ago has any relevance to the organization that you need two years from now…the organization, the interfaces…are always going to change."[435]

Much of organizational design theory revolves around the construction of only two types of organizations: the machine bureaucracy with a formal structure and the adhocracy which tends to spring in to being around social and task requirements.[436] As such, a belief in organization design persists that an organization can either be structured for efficiency (the forte of the machine bureaucracy) or for flexibility (the raison d'être of the adhocracy). Unfortunately, most real world situations, particularly as they apply to military operations, demand that organizations be both flexible and efficient. This introduces the notion of "dynamic tension" with regards to an organization needing to be simultaneously well-structured for efficiency while adapting to changes in their environment and mission.[437] This is the condition under which CFACC ISR must be operated.

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[435] Cited by Claudia Bird Schoonhoven and Mariann Jelinek , "Dynamic Tension in Innovative, High Technology Firms: Managing Rapid Technological Change Through Organizational Structure," Managing Complexity in High Technology Organizations, ed. M. Von Glinow, and S. Mohram, (Oxford: Oxford University Press, 1990), 233.

[436] Schoonhoven and Jelinek, "Dynamic Tension," 245.

[437] Ibid., 234.

The focus of such designs should not be to simply allow personnel to randomly organize themselves as they see fit. Given the high demand and low availability of most ISR assets, this is simply not possible if any hope of accomplishing the mission is to be realized. Instead, the organizational design must retain some semblance of the machine bureaucratic structure in which personnel have a clear understanding of their reporting and hierarchical structures, who their bosses are, who their subordinates are and who their counterparts are in other, equivalent organizations.[438] As the mission is executed, however, responsibilities and reporting relationships (direct liaison authority vice tasking control or administrative control authorities) must change to meet mission and environmental circumstances.[439]

It can be argued that this has been less effectively managed within the Brigade Combat Team (BCT) structure as the Army has attempted to adapt to the COIN requirements. Within the Effects Working Group, it is likely that personnel will shift into roles based on availability rather than on specific capabilities. For example, although it is very likely that the Provost Marshall will serves as the Security Line of Effort (LOE) chief, it is just as possible for the Air Force Electronic Warfare Officer to serve as the Reconciliation Officer.[440] Certainly somebody has to fulfill this role but if the organization develops into an organic, amorphous structure, it becomes increasingly difficult to operate in an efficient manner,[441] interacting with similar counter parts, and maximizing asset employment.

Rather, organization change should be expected and planned for with processes in place by which new reporting relationships are established and clarified and refined responsibilities are worked out.[442] Structure of an organization is designed to meet an explicit purpose, not to encourage random change by targeting and adapting to major

[438] Schoonhoven and Jelnike, “Dynamic Tension,” 236.

[439] Ibid., 239.

[440] Guvendiren and Downey, “PIR Development,” 5.

[441] Schoonhoven and Jelnike, “Dynamic Tension,” 234.

[442] Ibid., 245.

changes in the environment and mission.[443] The development of committees, task forces, and teams is done in conjunction with the formal structure, not as a replacement for it, and must be formally sanctioned by the organization. Such teams/groups become relevance-based and problem focused, allowing them to transcend boundaries that might inhibit problem solving.[444]

Knowing how and when to reorganize, requires leaders and personnel with highly developed cooperation and team skills[445] as well as the ability to be highly self-critical as an organization. This allows members of the organization to recognize their effectiveness within the current structure and if it is not functioning adequately, to develop alternative organizational designs.[446] But again, this demands an organization that has the potential for such re-design, developed not around a specific construct but emphasizing key nodes to be moved or adapted as necessary. The Air Force must develop such a construct if it is to be relevant in future conflicts.

There is an old saying that "we don't man equipment, we equip men." This must be the philosophy for dynamic organizational design, that we are not establishing an organization by which to man a weapon system but rather that we are providing a weapon system to enable our tactics, techniques, and procedures. Adopting such a view with regards to our organizational and systems architecture focuses on the fundamental interactions of the process versus emphasizing the means by which such interactions occur. (See Figure 46, Fundamental Nodes of the ISR Enterprise.)

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[443] Schoonhoven and Jelnike, "Dynamic Tension," 244–245.

[444] Ibid., 246.

[445] Ibid., 253.

[446] Ibid., 244.

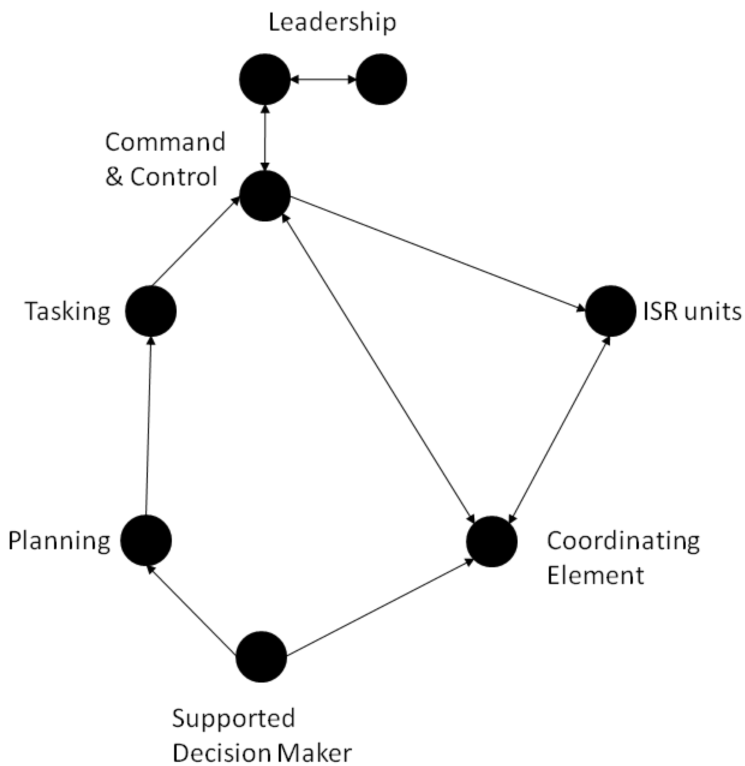

Figure 46. Fundamental Nodes of the ISR Enterprise

For example, in reviewing the interactions that occurred during the March 25–27, 2003 sand storm, we see many of the same linkages that occur in our final vignette. In 2003, a supported decision maker, the 3rd Infantry Division (3 ID) commander, needed to know where the 2nd Medina Division was located and if it was advancing on his soldiers. Through the established tasking process, his Division Collection Manager submitted a request for information through the Corps Collection Manager. The Corps collection manager (CM) validated the request and submitted it to the ISR Division (ISRD) of the CAOC where the collection requests were transformed into ISR plans. The ISRD collection managers tasked the ISR units and then handed off the ISR plan to the Intelligence Surveillance And Reconnaissance Cell (ISARC) to monitor and modify in real-time. In the case of the March 25 missions, the Joint Surveillance and Target Attack Radar System (JSTARS) was given a new mission and the Global Hawk (GH) was

redirected to new targets. The decision to make such changes was coordinated with the Senior Intelligence Duty Officer (SIDO) who worked with the Chief of Combat Operations (CCO) to ensure that such changes would not adversely impact other supported units or the next day's air tasking order (ATO). As the ISR units began reporting, Multi-Int Exploitation Cell (MEC), consisting of the Imagery Support Element (ISE), provided the ISARC with additional requirements for increased coverage and pushed the intelligence data to the Combat Operations Division where the CCO was able to redirect combat aircraft to target the Medina Division. The ISRD also forwarded the information via the Battlefield Coordination Detachment (BCD) to the 3 ID commander, allowing him to employ artillery and to redeploy his forces against the Medina Division. (See Figure 47, Conventional CFACC ISR Nodes [Blue Container Highlights Nodes Contained within the CAOC].)

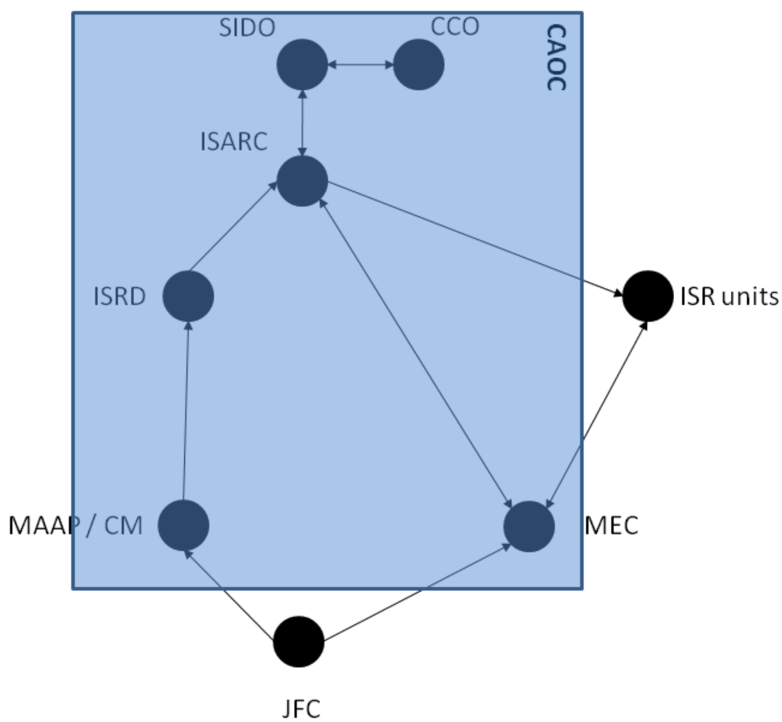

Figure 47. Conventional CFACC ISR Nodes (Blue Container Highlights Nodes Contained within the CAOC)

The Air Force has the capability to conduct "dynamic targeting" and to execute ISR operations with flexibility. These were tenets developed over years of focusing on mobile surface-to-surface missile launchers like the SCUDs of Iraq and the surface-to-air missiles like the SA-6 batteries of Serbia. In response, the Air Force developed tactics, techniques, and procedures along with training and exercise events to hone such skills. Now, the Air Force needs to learn to export these capabilities into the joint and interagency realms to support unconventional operations, such as COIN or disaster recovery operations.

As can be seen in Figure 47, many of the nodes existed within the CAOC, essentially a geographic co-location for essential nodes that the U.S. Air Force designated a Weapons System. The reason for this designation was based largely on the concerns of a machine bureaucracy, notably standardization of skill sets among personnel, improved interaction of systems, and the need to achieve efficiency with limited resources. Prior to this designation, each of the five Air Operations Centers (AOCs) developed its own tactics, techniques and procedures (TTPs) as required for their theater of operations. Each AOC sought out and acquired the systems necessary to execute these TTPs, often with consideration for allies in the region who may also need to interact with the AOC. Unfortunately, this construct resulted in a situation where personnel could no longer be transferred among the AOCs without considerable (and time intensive) training to orient them to how each AOC functioned. Systems interoperability suffered greatly as a mixture of software and hardware was introduced, often without any prior design for interaction which further complicated the training of new personnel and the employment of information technology (IT) experts. Finally, there was no coherent means for judging the effectiveness of an AOC because no standardization function could be established based on the wide variety of TTPs and systems.[447]

To counter this problem, the Air Force turned to the best example of systems and personnel management it had established, the employment of aircraft. Each aircraft

[447] Joseph H. Justice III, "Airpower Command and Control: Evolution of the Air and Space Operations Center as a Weapon System," (Strategy Research Project, U.S. Army War College, May 3, 2004), 7.

mission design series (MDS) is a designated weapons system, for example the F-16 Fighting Falcon. As such, no new equipment can be added to the MDS without a thorough test and evaluation process such as "SEEK EAGLE" in which all new additions (specifically weapons, pods, and fuel tanks) must be evaluated for interoperability, impacts to flight performance, and hazards to other systems employment.[448] Furthermore, the aircrew for each MDS are trained to the same exacting standards, guided by a standards and evaluation (STANEVAL) system that will rate the aircrew regardless of their duty location. This ensures that pilots from one base can fly the MDS located at another base and utilize the same TTPs. Managing the systems and training becomes much more efficient and units are more effective in combat because they can expect a defined level of capability in their counterparts from other bases.

For this reason, in September 2000, the Chief of Staff of the Air Force designated the Air and Space Operations Center a weapon system with the nomenclature AN/USQ-163 FALCONER.[449] This had the unintentional effect of reversing the focus on TTPs and instead emphasized the physical and systems architecture that enabled these capabilities. By designating the AOC a weapon system, the Air Force was able to better manage the introduction of new systems ensuring interoperability with the existing architecture, standardization among the AOCs, and improved training for its IT professionals. The designation also improved training across the board, establishing a standard by which all initial AOC assigned personnel could be trained and then providing the guidelines for STANEVAL shops to measure AOC performance. But the formalization of this bureaucratic structure has largely hobbled the Air Force's ability to operate beyond the physical and geographic confines of the AOC.

With the expansion of the military operations from Afghanistan to Iraq and the Horn of Africa (HoA), the CAOC suffered in its ability to effectively and responsively manage operations within each theater. The need to manage a finite number of air assets

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448 "Air Force Seek Eagle Office," *U.S. Air Force Fact Sheet*, http://www.eglin.af.mil/library/factsheets/factsheet_print.asp?fsID=6735&page=1, (accessed August 26, 2009).

449 Justice, "Airpower Command and Control," 6.

dictated a centralized command structure, but the result distanced air planners from decision makers for the ground units with whom they would be expected to support or integrate. Kinetic air operations were able to meet this challenge by relying upon the command and control structure already dictated by the Theater Air Control System (TACS) which is designed to interact with the Army's Air Ground System (AGS). In this fashion, much of the planning and tasking of close air support sorties was carried out in each theater by the Air Liaison Officers (ALOs) and Joint Terminal Attack Controllers (JTACs) assigned down to the battalion level and coordinated through the Air Support Operations Center at the Corps level. This structure was replicated in each theater, minimizing the CAOC's responsibility beyond that of managing those assets that could be transferred to any theater from one day to the next (primarily bombers and air refueling aircraft) and to ensuring that aircraft and aircrew were not pushed beyond their limits. This allowed for better interaction between ground and air planners and made the overall process much more responsive to theater requirements.

By 2006, the senior intelligence officer (A2) of the CAOC had recognized the need to replicate this process for the ISR enterprise. To this end, the first ISR Liaison Officer (ISRLO) was forward deployed from the CAOC to Multi-National Division North (MND-N) with the specific objective of coordinating CFACC ISR planning with the collection managers of the 25th Infantry Division responsible at that time for MND-N. The ISRLO was also tasked with training the ALO/JTAC teams throughout his area of operation to better integrate ISR assets with other airborne platforms to reduce redundancy between their taskings (as many fighters with targeting pods were being used as substitutes for full-motion video assets) and to alleviate airspace concerns.[450] By Spring 2007, two more ISRLOs had been deployed to Iraq with another ISRLO sent to Afghanistan. By the end of the summer of 2007, every Major Subordinate Command (MSC) in Iraq, including the U.S. Army Divisions and the U.S. Marine Expeditionary Force (located in Multi-National Force-West) as well as the British Army responsible for MND-South East, had their own ISRLOs. Among the MSCs, the ISRLOs provided

[450] CAOC ISRD Director, personal interview, May 15, 2007.

training for collection managers, ALO/JTACs, and supported decision makers as well as assisted in planning and increasingly, coordinated the employment of ISR assets in support of ground force operations.[451]

The dispersion of theater level full-motion video (FMV) assets to include Air Force, Navy, and Army manned and unmanned aircraft among the MSCs and managed by the Corps intelligence staff largely mimicked the nature of the Air Support Operations Center (ASOC). Unfortunately, the control and coordination of other ISR assets was still managed by the CAOC, which added an additional level of bureaucracy to the tasking of such assets, made them more difficult to plan and coordinate actions with, and ultimately made them less responsive, and in turn less valuable, to the needs of the supported ground units. By relying upon the ISARC at the CAOC to manage the dynamic ISR requirements of three disparate theaters of operations, the CFACC essentially made his non-FMV ISR irrelevant to the fight at hand. Tasking for such capabilities would continue to be forwarded but largely without any expectation for such capabilities to impact the operations they were supposed to be supporting.[452]

What is required is a full acceptance of the dispersed node construct (see Figure 48, COIN ISR Nodes). Having successfully demonstrated the capability to a limited degree with the ISRLOs and FMV management, the CFACC should not only execute decentralization in the current fight but must plan for such operations in the future. For the CAS community it makes sense to establish ALOs down to the BCT level and JTACs as low as the battalion level with an ASOC typically aligned at the Corps. In so doing, U.S. Air Force personnel are assigned to U.S. Army posts and train on a regular basis with their Army counterparts. But CAS is a kinetic mission suited only for combat operations (regardless of their place along the "spectrum of warfare.")

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[451] Personal observations from May through November 2007.

[452] Michael L. Downs, "Rethinking the CFACC Intelligence, Surveillance, and Reconnaissance Approach to Counterinsurgency," (Naval War College, May 10, 2007), 11.

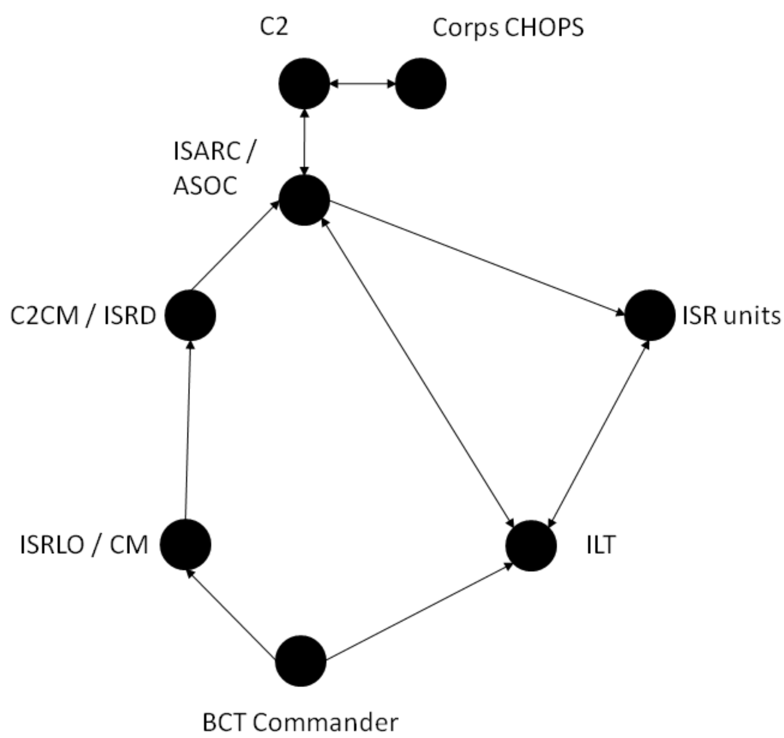

Figure 48. COIN ISR Nodes

ISR, on the other hand, is not inherently limited to combat operations. In fact, the U-2 and Global Hawk have a long history of supporting efforts to suppress wildfires within the United States.[453] During the rescue and recovery operations following Hurricane Katrina, U.S. Air Force ISR, to include planning, tasking, and coordination elements, were heavily involved in attempts to find survivors and identify the next likely flood areas.[454] It is not unreasonable to expect such operations to occur again in the future, either within the United States or in support of other countries. For this reason, decentralization of CFACC ISR must not focus solely on integrating with the U.S. Army but on the ability to integrate with any joint, coalition, or interagency task force.

453 "Global Hawk, U-2 Capture Essential Wildfires Images," Tyndall AFB Public Affairs, October 29, 2007, http://www.af.mil/news/story.asp?id=123073731 (accessed August 30, 2009).

454 Kevin L. Buddelmeyer, "Military First Response: Lessons Learned from Hurricane Katrina," (Master's thesis, Air Command and Staff College, April 2007), 26–27.

This can only be done by identifying those key nodes that must exist with regards to the ISR planning, tasking, and coordination of ISR efforts and where those nodes must exist in relation to supported units/agencies. Planners must be aligned with the lowest designated level of decision makers for a particular area of operations. In the case of the Army, this was the BCT commander who was given responsibility for a particular battlespace. In disaster response operations, this could be a county emergency services command post or a Coast Guard station depending on how such operations are being coordinated and directed. The nature of the contingency will largely dictate if efforts can be centrally managed (as in the case of waging war against a machine bureaucracy) or when decisions must be made at lower levels due to the diverse environment and threats being faced (as in a COIN campaign). A key that may help in identifying the appropriate level of decision making is the movement of key resources. If during a recovery operation, helicopters are "owned" by a particular organization and meted out based on that organization's understanding of priorities, this is probably the appropriate level at which to assign ISR planners. This becomes increasingly apparent as that organization becomes responsible for more and more assets. As in the case of the BCT, the Corps and Division had pushed many of their "enabling" capabilities (to include UAVs, human and signals intelligence analytic support, and reconstruction teams) down to the BCT level where that commander was responsible for deciding which subordinate units would receive those assets when requested. If there are multiple agencies that own different types of assets, for example one agency controls all the helicopters while another controls the boats, it is very likely that the next higher echelon is providing them direction on whom to support so that helicopters and boats can both be pushed to the same element requiring support. In such a case, ISR planners belong at that higher echelon.

Senior tasking elements, those responsible for deciding what requests are appropriate and to which sub-elements to give priority of support, should be located at the senior "task force" level. Though not specifically designated as such, the Multi-National Force in Iraq is the equivalent "joint task force" in theater (having replaced Combined Joint Task Force 7, on May 15, 2004). On August 30, 2005, North Command (NORCOM) established Joint Task Force-Katrina to coordinate Department of Defense

support to Hurricane Katrina relief operations;[455] this would likely have been the appropriate level for senior tasking elements. It is at this level that decisions of how to prioritize resources will be made. In many cases, as in COIN, the decision may be based on the importance of a particular unit or region. Therefore, regardless of what they are specifically requesting, the unit will receive assets based on their relative priority compared to other units. In a relief effort, however, a more traditional prioritization may be appropriate in which the specific mission is more important than the requesting unit. Typically, efforts to save lives will rank higher than efforts to begin clearing debris, regardless of whether the requestor is in a small town in Mississippi or in New Orleans.

Similarly, an ISARC should be deployed to this level in order to provide command and control of ISR assets in real time in order to adapt to the dynamic requirements of the supported agencies. Another consideration for where to deploy the ISARC will be based on from where assets are actually controlled, just as the ISARC should be collocated with the ASOC to improve deconfliction of assets. Aircraft may be based out of particular airstrip but if their flights are controlled by a more centralized air traffic control facility, that is where the ISARC will need to be located to minimize the potential for airspace problems.

Understanding that civilian agencies, particularly local law enforcement, are likely to be highly inexperienced with regards to the requesting, tasking, and even capabilities of ISR assets, the need for the ISRLO and supporting ISR Liaison Team (ILT) will be significantly greater. The ILT will again need to be deployed to the lowest responsible decision maker to ensure that intelligence is not limited to just Joint Task Force (JTF) level "situational awareness" but is actually made available to on-scene providers and first-responders.[456]

By developing a dynamic organization design, the CFACC can be best prepared to support ISR operations in a multitude of events. During major theater war, the nodes collapse back to the geographic centrality of the CAOC, utilizing the ISRLOs as planners

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[455] Buddelmeyer, "Military First Response," 3.

[456] Ibid., 4.

in the Master Air Attack Plan (MAAP) team or in the collection management cell and the Airmen of the ILT as members of the MEC. The ISARC is simply not deployed forward but retains its same functionality. As the war transitions to later stages, or should the need arise to differentiate the theater by Joint Task Forces, then the CAOC begins to decentralize, forward deploying an ISARC to each JTF and responding to the decentralization of decision making by forward deploying ISRLOs and ILTs as necessary.[457] In response to a natural disaster, the ISR nodes "fly away" to the supported elements throughout the responding agency's organization, aligning as best possible with the appropriate echelon.

2. Selecting and Training COIN Airpower Experts

Since the invasion of Afghanistan in 2001, the U.S. military (and certain "other governmental agencies") has acquired a vast array of ISR platforms capable of feats previously unimagined and those numbers of assets and variations in capabilities continue to increase on a regular basis. It is impossible to assume that a collection manager or ISR planner in the MAAP team or an ISRLO could be an expert in the execution of all of those systems. It is equally unlikely, however, that the experts in employing each of those systems have a sufficient understanding of other systems or the COIN campaign to recognize their ability to contribute effectively. Therefore, what is required is someone with just enough knowledge about each of the ISR platforms and about the COIN campaign itself to recognize opportunities to put systems together to solve a problem. This largely reflects the fact that "experts have no role other than non-expert participants" in the resolution of a wicked problem. It is not that wicked problems do not require "experts" but rather that the disparity between an "expert" and a "lay person" is significantly reduced with regards to wicked problems as each person becomes an expert with regards to their own problem.[458] CFACC ISR experts must therefore be trained not to focus on specific systems requirements (such as how to post a collection request within PRISM) or merely on memorizing the full capabilities of all CFACC ISR

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[457] JP 3–24, V-3.

[458] Hisschemoller and Hoppe, "Coping with Intractable Controversies," 63.

assets in use. Rather, ISR experts must be focused on the employment of ISR emphasizing cross-cuing and layering of ISR capabilities, integration of ISR into operations, and the ability to coordinate ISR capabilities in real time.

ISR experts will be those who have the ability to understand the supported unit or decision maker's needs, a sufficient understanding of asset capabilities to ask the right questions of that asset's experts, and the ability to develop a thorough ISR plan *integrated with* the operations plan to include command and control concerns and necessary communications applicability. Fortunately, the Air Force has acknowledged such requirements, reducing the emphasis upon PRISM employment and the management of collection requests at such training as the Intelligence, surveillance, and Reconnaissance Operators Course (IROC), and training personnel to be ISR planners with a fuller appreciation for all that entails. The Air Force has also employed graduates of the U.S. Air Force Weapons School's[459] Intelligence Sensor Weapons Instructor Course to lead/advise key ISR nodes throughout the enterprise to include being the deputy collection manager at the CAOC and Corps level, serving as ISRLOs when available, and training/guiding ISR units.

Having demonstrated a capability to plan ISR and to integrate it with supported unit operations and organic capabilities, ISR experts should then be elevated to real-time coordination of ISR effects as members of the ILT, intelligence duty officers/technicians (IDO/IDT) leading the ISARC, or as Senior Intelligence Duty Officers. A thorough understanding of how an ISR plan is developed, the intricacies of balancing limited assets against high priority requirements or integrating compatible systems, is essential to being prepared to modify such plans "on the fly" during dynamic operations. Too often, personnel with no prior ISR planning experience are put in charge of executing ISR plans and adapting them as necessary. As can be expected, such situations rapidly

[459] The USAF Weapons School is the Air Force equivalent of the Navy's famed "Top Gun," except it is more than 4 times as long and brings in a wider array of operators to include intelligence specialists to be students.

deteriorate when a carefully constructed plan is unnecessarily modified, disrupting key interactions and inefficiently wasting assets on efforts that could have been better supported in other ways.[460]

In turn, the ISRLOs will need a greater ability not to plan ISR so much as to interpret their supported decision maker's needs but to also leverage the organic resources of the unit or to best integrate CFACC assets. ISR planning expertise will be an excellent foundation, but the ISRLO will require well-honed interpersonal skills to optimize their forward deployments with other services or agencies. Not only will they need to deal with personnel with different jargons, career backgrounds, and perspectives but each organization will have a greater or lesser understanding of what ISR can provide. Therefore, the attributes that an ISRLO should possess should largely mirror those attributes common to social entrepreneurs: Creativity, Entrepreneurial Quality, the ability to Plan for the Enduring Nature of their Change after their departure, and an Ethical Fiber.[461]

The majority of ISR assets (though this balance is tipping as the Long War continues) were designed to be employed against a conventional military force (a machine bureaucracy) within a conventional warfare setting. For these reasons, ISRLOs will require a significant amount of creativity in order to piece together seemingly incompatible capabilities, leveraging the long duration, extended analytical capabilities of the CFACC ISR enterprise in support of the tactical expertise and on the ground familiarity of the U.S. Army customer. Such creativity will often rely on looking for experts in a host of different platform communities, reviewing unpublished papers and studies that may reveal yet untapped capabilities, and formulating questions in such a way as to garner interest and support by CFACC ISR crews and analysts. While Army collection managers are often prompted to ask for "an ISR effect" and not a capability, many are unable to sufficiently explain their desired effect while many more ISR "experts" within the CFACC ISR community are unable to match such desired effects to

[460] Personal observations.

[461] Bornstein, *How to Change the World*, 124–127.

the capabilities of their assets. The ISRLO will likely not have the answer but should be able to ask the question in such away as to generate the answer from the right people.

Entrepreneurial quality is explained as "the toughest" criteria to evaluate.[462] At best, it is simply someone who is not only capable of "getting things done" but can in fact change the entire way in which a particular system deals with a problem. People possessing such a quality have a "vision of how society will be different…not only at work in one place, but at work across the whole society."[463] This may sound like a lofty goal for the ISRLO, but in an environment with little precedent for ISR employment and when dealing with a machine bureaucracy—prone to inertia—the ISRLO may be the lone champion for new tactics, techniques, and procedures (TTPs). Furthermore, the ISRLO must be prepared to "tilt at windmills," doing battle with peers and superiors who are locked in traditional, conventional, or unyielding paradigms that fail to acknowledge the realities of the COIN campaign.

The "social impact of the idea" dictates that the ISRLO cannot simply make a change, but must do so in a manner that will endure even after that individual has moved on. This has been one of the largest obstacles for the ISR enterprise, that it is largely personality dependent. Once an ISRLO or collection manager rotates out and a new ISRLO or collection manger moves in, changes that were successfully implemented often fall by the wayside, lacking their champion to further the cause. The ISRLO must be able to not only make changes in the way things are done but must be able to articulate the reasons for those changes in such a way as to garner lasting support for the idea, to the point that it becomes detailed in joint and service doctrine. Failing that, the inherent rotation system will prevent any lasting change in CFACC ISR support to COIN campaigns.

Finally, the ISRLO must have sufficient "ethical fiber" to act as an honest agent both for the CFACC for whom he or she represents as well as for the supported decision maker to whom he or she is assigned. The Army is understandably distrustful of an

[462] Bornstein, *How to Change the World*, 124.

[463] Ibid., 125.

outsider over whom they have no doctrinal control. It can take significant amounts of time and effort to generate the trust necessary to be an effective liaison. Similarly, the CFACC is likely to suspect that the ISRLO has gone native if the ISRLO is proposing changes or requesting capabilities that are incompatible with the CFACC's established doctrine. There must be an understanding by all parties that the ISRLO, as a representative of the CFACC and as the spokesperson for the land component, will act in the best possible interest of all involved. This may require making decisions that will negatively influence some stakeholders at various times but their actions must never been seen as parochial or disingenuous.

Such an individual must be carefully selected from among those with ISR planning expertise and likely a background in the Air Intelligence Officer (AIO), Information Integration Officer (IIO), or ISR Mission Commander (ISRMC) billets onboard the JSTARS, Rivet Joint, and the Distributed Common Ground System (DCGS), respectively. It is likely that the necessary training for an ISRLO will largely reflect that of the CAS community's forward air controllers who are volunteers to "upgrade" from a basic fighter pilot role to one focused on finding the enemy and directing attacks against them. The ISRLO candidate will have already demonstrated high capability in their day-to-day ISR job but will volunteer for this additional duty, undergoing training to understand a wider array of ISR capabilities and how to integrate such capabilities with supported units. Finding someone with these criteria is not sufficient for ensuring they will be successful in the field. Rather, the program can again benefit by understanding the six successful qualities of the social entrepreneur.[464]

The ISRLO must be willing to self-correct. "The formulation of a wicked problem *is* the problem!"[465] Therefore, the ability of the ISRLO to generate a solution to a problem (by piecing together good ideas provided by other experts) requires an on-going process of solution development, problem understanding, and new solution

464 Bornstein, *How to Change the World*, 238–246.

465 Rittel and Webber, "Dilemmas," 161.

development.[466] If the ISRLO ignores this principle of "wicked problems," he or she is likely to commit to a solution that will be less than optimal or will generate problems that outpace the benefits derived from the solution. Therefore, an ISRLO must always be prepared to change the course of action, to seek out new solutions, and to back away from bad ideas.

As noted above, the ISRLO is not going to be the problem solver. They will be the mechanism by which various capabilities are brought together to effectively resolve the problem. Therefore, to be effective (and to be honest about their own contributions), they must be wiling to share credit. Not only can a failure to do so discourage future assistance from others, but it fails to allow natural networks to build between various entities if the belief persists that all solutions must go through the ISRLO. As noted above, part of what makes a good ISRLO is if the solutions are able to endure in the absence of the ISRLO. By giving credit to those who contributed to the problem's resolution, the absence of the ISRLO will not prevent others from knowing the right people to contact with similar problems in the future.

Given that the CFACC is mired in a conventional war fighting paradigm, largely dependent on assets and force structures designed for dealing with a machine bureaucracy, it largely goes without saying that the ISRLO must be willing to break free of established structures. This is not limited simply to a "rebellious spirit" but acknowledges a breath of knowledge and a willingness to research other paradigms in order to make such a break effective. Simply defying established processes is neither effective nor career enhancing.

The ISRLO is by definition an individual who crosses inter-disciplinary boundaries. Typically possessed of a background within the CFACC ISR community, the ISRLO is embedded in the world of the land component and expected to develop a thorough understanding of how the Army operates, their needs from ISR, and even how their ISR assets and structures operate in order to best integrate the capabilities of the

[466] Rittel and Webber, "Dilemmas," 161.

CFACC. An inability to acknowledge the uniqueness of the Army's perspective or to incorporate the successful capabilities of either component will typically lead to an unsuccessful career as an ISRLO. Only by working from the ground-up, interacting with the soldiers who are going to be executing missions based upon the intelligence derived from CFACC ISR assets, can the ISRLO fully appreciate the problems that need to be resolved and therefore implement the necessary change.[467]

Unlike the social entrepreneur who may work for decades before achieving "success" in their social advances,[468] the ISRLO will have at most months, but more likely only weeks to achieve the changes necessary to advance ISR support in COIN operations. Such changes will only come from a daily fight against established procedures and a willingness to continue pushing forward ideas that may be repeatedly crushed. What an ISRLO is attempting to do is change attitudes regarding the CFACC's roles and capabilities in the support of COIN, influencing behaviors in support of new TTPs, and attempting to overcome service prejudices and institutional fears generated from years of budgetary fights and inter-service rivalries.[469] An ISRLO must be possessed of a determination that will help them seek out those able to further their ideas despite recurrent obstacles in their path. Often the successes that become tangible and establish precedence only occur after frequent failures to achieve traction and from days upon days of working quietly towards that success.

Along with this quality goes the need for the ISRLO to not simply trumpet a good idea but the ability to build the steps to enacting that idea. The ISRLO must provide not just the idea but a series of "how-to's" in order to execute that idea.[470] This requires the ability to "close the loop" on every action, ensuring all involved know their roles and responsibilities and holding them to task. It also requires that the ISRLO do much of the

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[467] Bornstein, *How to Change the World,* 21.

[468] Ibid., 242.

[469] Ibid., 47.

[470] Ibid., 122.

"grunt work" to get the solution implemented by ensuring that all players are effectively linked and that each part of the problem resolution is effectively integrated with all other elements.

Lastly, the ISRLO must have a clear motivation for their actions.[471] There are certainly easier jobs within the CFACC and ISR in particular. Assignments that are likely to involve less travel through dangerous areas and sleeping arrangements that don't require a sleeping bag and sidearm. The ISRLO must therefore be an individual who chooses to endure such hardships in the interest of improving the effectiveness of the joint team, of furthering the capabilities of the CFACC, and of saving the lives of the young soldiers called upon to do harrowing acts.

Not every Air Force intelligence officer is suited to be an ISRLO. With this in mind, the Air Force must avoid the mechanistic temptation to view its personnel as interchangeable, particularly with regards to these highly visible and critically important duty positions. Within the ALO community, the Air Force has settled for finding bodies to fill slots, putting pilots who normally fly air-to-air fighters into jobs in which they are expected to be the "experts" on Close Air Support. While these ALOs have training in the fundamentals of such operations and enlisted personnel who have matured in the community to provide more immediate expertise, the ISRLO program does not yet have such support structures. War is not the time to learn fundamentals; it is the time to implement excellence.

Considerable discussion has focused on where this new team of ISR experts should reside. Many consider the need to develop trust between the Air Force and the Army to be of paramount concern and therefore recommend that the ISRLO in particular but the forward deploying ISARC elements should be assigned to Army posts where they can conduct daily training and participate in Army exercise events.[472] Others have

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[471]Bornstein, *How to Change the World,* 244.

[472] 3 EASOG/DO, e-mail message to author, August 10, 2009.

countered that the lack of access to ISR assets and the perishability of unique ISR skills demands that ISR professionals remain with Air Force ISR units until they are needed.[473]

The compromise for these two positions would be to permanently assign the Division level ISRLO to the Air Support Operations Squadron that contains the Air Liaison Officers and Joint Terminal Attack Controllers aligned with each Army Division. As the ASOS is assigned to the supported Division's post, this would allow the ISRLO to conduct daily training with the Army collection managers and the Air Support Operations Squadron (ASOS) ALOs/JTACs, build trust in the ISRLO concept and the Air Force's ability to provide ISR support, and to integrate additional Air Force ISR personnel as necessary.

The remainder of the ILT contingents would in fact remain with their ISR units to ensure they are knowledgeable on the latest tactics, techniques, and procedures and that they build the interpersonal relationships that may be necessary to coordinate support with reach back organizations. The ILT would deploy with the Army for any major exercises and would routinely travel to their supported units to make face-to-face contact with their Army counterparts. In this fashion, the ILT program would largely reflect the old Battalion Air Liaison Officer program where pilots (typically A-10 pilots) remained with their flying squadrons for day-to-day operations but deployed with their supported Army units for exercises and real world operations.[474] The ILT members would then be able to augment their ISR unit manning when the Army was not deployed, helping to shore up the personnel gap within the Air Force intelligence community.

3. Equipping for COIN ISR

Developers of ISR equipment (to include both assets and the hardware used to provide connectivity for ISR enterprise nodes) must begin with two assumptions: that all contingencies requiring ISR support cannot be anticipated and that technology will continue to advance at a pace far outstripping the budgeting and procurement process

[473] MNC-I ISRLO, e-mail message to author, April 12, 2009.

[474] 3 EASOG/DO, e-mail message to author, August 10, 2009.

currently used by the U.S. military. With this understanding, developers should focus on "open source" platforms and "plug and play" assets that will allow for rapid modification as necessary to meet the needs of the particular situation.

The development of future ISR platforms should take a cue from the Chinese motorcycle manufacturer Lifan which has focused on a modular architecture. Standardized interfaces, much like the ubiquitous universal serial bus (USB) port on all contemporary computers, allows for the attachment of component subsystems such as new sensors or communications relay gear.[475] Although the RC-135V/W Rivet Joint has long benefitted from the use of Quick Reaction Capabilities (QRC) first as hardware additions and now largely as software interfaces,[476] most U.S. Air Force ISR platforms lack this capability, relying instead on permanently affixed sensors that receive only minor updates through the original manufacturer. The U-2 has he capability to swap out its radar imaging sensor with its electro-optical/infrared sensor or with its optical bar (film-based) camera but these are only options in the established hardware. There is no capability to add a new sensor all together. The same holds true largely for the Global Hawk, Predator, and Reaper.

The U.S. Air Force has made two significant changes to its ISR procurement strategy that reflect this new understanding of the dynamic ISR requirements of COIN. The first was the development of "Gorgon Stare," a wide area, persistence surveillance camera which was initially envisioned to be an addition to the MQ-9 Reaper. The Air Force has since decided to implement the Gorgon Stare on a wide range of platforms, designing it to be "platform agnostic" with the ability to feed into a common system, namely the DCGS enterprise.[477] This use of podded sensors to be incorporated on any manned or unmanned system represents a tremendous step forward in the procurement of future capabilities. Rather than building an ISR platform as one complete project, the

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475 Don Tapscott and Anthony D. Williams, *Wikinomics: How Mass Collaboration Changes Everything* (New York: Portfolio, 2006), 222.

476 John Knowles, "Inside the New Rivet Joint," *Journal of Electronic Defense (29)*: 11.

477 Stephen Trimble, "USAF to unleash 'Gorgon Stare' sensor in 2010," *Flight International*, January 28, 2009.

focus can be just on the performance characteristics of the aircraft (high, medium, or low altitude or high speed versus long dwell times, etc.) while sensors can be developed, added, and replaced separately.

The second development for the U.S. Air Force is the recent design, production, and deployment of the MC-12W Liberty manned surveillance platform. Though there have been some criticisms about the adoption of a platform already largely in use by the Army[478] or the waste of money and effort on a manned platform versus an unmanned platform,[479] the MC-12W is remarkable both for it is quick adoption and for its ability to "roll-on, roll-off" sensors as necessary. Admittedly, the MC-12W is a response to the Army's success in using the C-12 platform (one with which it has decades of prior experience with such as the RC-12 Signals Intelligence aircraft) in its Task Force ODIN (Observe, Detect, Identify, and Neutralize).[480] Many felt this was a capability that should have been available from the CFACC and pioneered by the Air Force. While the MC-12W does have considerably shorter persistence, the piloted aircraft does not have to share time on the highly limited bandwidth required to remotely control the MQ-1 and MQ-9 unmanned assets. Similarly, imagery and signals intelligence are exploited on-board the aircraft, reducing the need to transmit large volumes of information off the aircraft to another exploitation cell. Again, a concern regarding the amount of available bandwidth in each theater and the potential for unintentional interference with other broadcasts. Regardless, the MC-12W represents a move toward the "plug and play" of commercial and government off-the-shelf (COTS/GOTS) technologies that will allow new capabilities to be more rapidly introduced to the fight at a much lower cost.[481]

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[478] Robert F. Dorr, "Air Force is Trying Too Hard to be Army," *Air Force Times*, June 29, 2009, http://www.airforcetimes.com/community/opinion/airforce_backtalk_army_062909/ (accessed August 30, 2009).

[479] Robert W. Moorman, "ISR: Manned Vs. Unmanned, UAV Advocates Question U.S. Liberty Aircraft Funds," *C4ISR Journal*, June 02, 2009, http://www.c4isrjournal.com/story.php?F=4034350 (accessed August 30, 2009).

[480] A.Thomas Ball, "Task Force ODIN Using Innovative Technology to Support Ground Forces," *Digital Video and Imagery Distribution System*, September 20, 2007, http://www.dvidshub.net/?script=news/news_show.php&id=12463 (accessed August 30, 2009).

[481] Tapscott and Williams, *Wikinomics*, 222.

The draw back to such designs is largely related to unused space. In order to provide sufficient area for the introduction of new sensors or communications suites, the aircraft must naturally be designed larger than necessary for a single sensor/communications capability. The addition of various mounting brackets adds weight to the aircraft and the potential for "non-permanent" mounting increases the potential for such payloads to shift in flight, damaging the suite itself or potentially creating unsafe flying conditions for the aircraft. Still, the technology must be embraced and improved upon in order to provide ISR customers with the needed capabilities.

With regards to ISR management software, it too needs to focus on an ability to leverage the latest technology. Highly structured and "stove piped" technologies such as PRISM impact the ability of organizations to adapt to changes in ISR management and prioritization. While PRISM served as the official means of submitting collection requests, many collection managers developed their initial requirements on Microsoft Excel spreadsheets, adding or removing columns as necessary to provide the level of detail or to format the data in a means appropriate to the tasking agency. Sharepoint software was leveraged to manage requests in such a manner that anyone could access the request and get an understanding of what information was requested and how it was intended to support operations. Microsoft PowerPoint was employed to produce mission concepts of operations (CONOPS) in a mission type order format that provided the necessary mission graphics (usually the latest available imagery) along with the common reference points to be used on the mission. Such technology is simple to use, easily accessible, and typically designed to be modified. Rather than focus on the specific systems required, ISR planners, taskers, and coordinators must be able to identify the requirements for the mission and adapt the available systems to the process. An ISRLO may deploy to an Army unit and find that their basic situational tool is the Command Post of the Future (CPOF) or may join up with an interagency relief organization that uses Google Earth to track events. By understanding the requirements, capable ISR professionals will be able to adapt the available systems to their needs.

C. TRAINING FOR COIN

Training for ISR professionals is woefully inadequate. Due to the highly limited number of ISR platforms available, few in the ISR constellation are able to train with the necessary platforms prior to deployment. Large military exercises often emphasize operations over the ISR support that fuels them, ignoring the requirements for obtaining the intelligence that enables the actions.[482] In many cases, exercise participants are simply handed the intelligence necessary to begin planning without tasking, or more importantly, training the ISR specialists who would actually need to acquire the information.

Common Ground Station (CGS) operators in Iraq who analyzed JSTARS Ground Moving Target Indicator (GMTI) feeds, often deployed to Iraq without ever turning their systems on for the simple fact that no JSTARS was available with which to train.[483] Once in theater, their ability to successfully contribute to operations was dependent on their ability to learn quickly, during real world execution. This is, of course, unsatisfactory. Even when one ISR system is available for training, as in the case of organic unmanned aerial vehicles (UAVs), the nature of ISR requiring cross-cuing and layering is impossible to demonstrate. Planners, and leaders, therefore become dependant upon the systems with which they are most familiar and fail to appreciate the capabilities provided by other systems.

Exercises have recently begun simulating an increasing number of ISR capabilities to include the use of virtual UAVs and JSTARS feeds which use the instrumentation used to manage an exercise to feed the ISR structure. For example, to track vehicles moving around a training range, exercise vehicles mount a special transponder device. This allows the vehicle to be "killed" during attacks and to prevent mishaps at night or adverse weather. This same transponder, however, can be used to mark "contact" locations on a GMTI feed or to indicate where a computer modeled

[482] Jeremiah Burgess, e-mail message to author, June 12, 2008.

[483] MND-B ISR Operations Staff, personal conversations with author, August 2007.

vehicle should be added to a virtual UAV feed.[484] Though not 100% accurate or realistic, this type of technology can vastly improve the training of ISR professionals and permit better planning and real time coordination during exercises.

The *Theater ISR CONOPS* explains:

> Training and education for ISR personnel must focus as much on operations-related issues as it does on intelligence…ISR [planners] must have a firm grasp on military doctrine and theory in order to fully integrate ISR into the campaign….The realities of modern warfare require a change to the training philosophy of ISR personnel… [who] must be a main training audience during major exercises.[485]

As suggested earlier, ISR is not conflict limited. With this understanding, ISR leaders must look beyond military training exercises to opportunities in which their capabilities can be exercised and demonstrated. In anticipation of future recovery operations, CFACC ISR planners and liaisons should be involved in Federal Emergency Management Agency (FEMA) and Department of Homeland Security (DHS) exercises. Though these exercises may require employing the same virtual environments currently employed in military exercises, ISR must not be overlooked and should be integrated into initial planning considerations.

D. CONCLUSION

Counterinsurgency operations have highlighted the limitations of the U.S. Air Force's strict adherence to a major theater war doctrine. By limiting its structure to the confines of the CAOC, the CFACC is unprepared for the distributive nature of COIN campaigns or non-combat related operations. To alleviate these problems, the ISR constellation must adapt a construct that encourages dynamic design, incorporating technologies that allow for rapid innovation and deployment, and train personnel for the complex planning and interactive nature of their work. The Air Force has already demonstrated the capability to execute this type of employment standard in limited ways.

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[484] Personal observations from the 505th Operations Squadron in support of U.S. Air Force Red Flag and U.S. Army National Training Center exercises from June 2006 through June 2008.

[485] *Theater ISR CONOPS*, 31.

The ISRLOs, the very nature of dynamic targeting, and the distribution of FMV capabilities to the division level all suggest that the CFACC can replicate this form of employment on a larger, more permanent scale.

But to do any of this requires a formal doctrine acknowledging the dynamic nature of COIN and ISR in particular. Only when Air Force leadership takes such concerns seriously will priority of funding go to the right systems, personnel, and training. Failure to document the hard won lessons of the current fight will leave the CFACC ill-prepared to support future operations and will demand that ISR professionals relearn lost TTPs.

VII. CONCLUSION—PUTTING IT ALL TOGETHER

A. INTRODUCTION

The 2005 re-organization of the U.S. Army to better meet the needs of counterinsurgency (COIN) warfare did not create the problems with the Intelligence, Surveillance, and Reconnaissance (ISR) support provide by the Combined Forces Air Component Commander (CFACC). Rather, it simply highlighted the limitations of the U.S. Air Force's strict adherence to a major theater war doctrine and its poor fit of the ISR structure with the demands of COIN. As our military continues to foresee "intelligence driving operations," the need for timely, applicable ISR support will continue to grow. Unfortunately, as CFACC ISR assets continue to be added to the Iraqi and Afghan Theaters of Operation at an increasing rate, their utility is hampered by the requirements of a planning/tasking/execution process largely developed for a conventional force-on-force engagement.

Fortunately, many of the problems highlighted in this thesis have already been addressed. The CFACC has significantly increased the number of available ISR collection opportunities, deploying an ever increasing number of unmanned aerial vehicles (UAVs) and airborne ISR crews, as well as increasing the number of missions flown and targets collected by each asset. Additionally, the ISR Division (ISRD) of the Combined Air and Space Operations Center (CAOC) has developed new processes that allow for more direct interaction of ISR platforms with supported ground units through the deployment of ISR Liaison Officers and the assignment of "direct support" missions in which an ISR asset flies under the direct guidance of the supported unit rather than on a pre-determined collection mission with a set of specific targets. These solutions are a credit to the hard work by junior officers in all services as they attempt to overcome the inertia of their organizations and the restrictions of their doctrine. But these current endeavors are largely piece-meal affairs that lack formalization and are susceptible to personality-based disruptions, providing little more than "temporary fixes" to an institutional problem that requires re-inventing the process in whole to make genuine, lasting improvements.

The Air Force has yet to take the significant steps necessary to develop an adaptive organizational structure and a doctrine designed for dynamic problem sets. To mature into a capable organization suited to the fluid nature of modern military operations, the CFACC must guide the ISR enterprise to enact structural changes that encourage dynamic design, decentralize planning and decision making, and focus on developing integrated solutions to the unique problem sets of supported commanders.

B. ORGANIZATION RE-DESIGN TO IMPROVE RESPONSIVENESS

The U.S. Army transformation to the modified Brigade Combat Team (BCT) structure made the Army more agile with regards to its decentralized adversary and better resourced to address the unique problems associated with the larger context of counter insurgency. This transformation also desynchronized the joint planning process, focusing on the necessities of grass-roots planning and small unit employment. The conventional planning process was designed such that U.S. Army and U.S. Air Force planning were conducted in parallel, driven from the top down with guidance, resources, and requests directed by the Joint Force Commander's explicit priorities of effort. This proven sequence of reciprocal planning, tasking, and execution ensured that both the land and air components were sufficiently prepared to execute operations simultaneously and in coordination with one another. By failing to follow the Army's lead in decentralizing not only the execution but the planning of operations to the appropriate level, the U.S. Air Force allowed this parallel process to devolve into a sequential order of events that significantly hampered coordination between the two components.

1. Creating Joint Adhocracies to Improve Coordination

To develop the Air Force organizational counterpart to the U.S. Army's Brigade Combat Team will require restructuring the machine bureaucracy of the CFACC into one better suited to the adhocracy represented by the BCT. The resulting structure should allow the Air Force to rapidly and effectively integrate Air Force personnel and capabilities into joint, coalition, and interagency task forces. Unlike the Army's focus on a permanent adhocracy in the form of its BCTs, the Air Force must view its participation in any adhocracy as a temporary measure specific to that environment and

problem, and be prepared to adapt to and support other joint/coalition/interagency task forces or processes. In short, there may not be one ideal solution that works across the board to support various "customers." The resulting Air Force structure must be focused on creating capabilities that are more easily tailorable to a host of different needs as opposed to finding the "ideal" solution for its current Machine Bureaucracy or the "perfect" match for the current U.S. Army adhocracy.

The Air Force should focus on developing a capability to "export" the key components of its CAOC to join with the supported command structures, assigning personnel and coordinating planning at the most appropriate level given the circumstances. Establishing an organization focused on the key nodes of ISR planning, management and control, will allow the CFACC to provide the necessary adaptability required by the supported units while retaining the ability to supervise the welfare of the constrained ISR fleet.

Planning and execution functions have been significantly improved by deploying ISR Liaison Officers (ISRLOs) to represent the concerns of the CFACC while providing the ISR background necessary to enable planning at the BCT level. ISR Liaison Teams (ILTs) consisting of enlisted ISR experts trained to coordinate ISR effects in real time, should be attached to BCTs to coordinate CFACC and Combined Forces Land Component Commander (CFLCC) effects. While the U.S. military has a long history of joint integration, it may be necessary in some events to integrate ISR planning and execution with inter-agency task forces as well, many of which lack the formal structures of the U.S. military. Air Force personnel must therefore be prepared to support agencies with a very poor understanding of the limitations and capabilities of ISR and must be enabled by a structure that is flexible enough to adapt to transforming hierarchies. When identifying the appropriate agencies or echelon for integrating Air Force efforts, CFACC leaders should identify the location of the designated "decision-maker" who possesses the most organic capabilities for executing their decisions. In 2005, the CFLCC focused planning and execution of counterinsurgency operations at the BCT and therefore made

the BCT the appropriate level to which U.S. Air Force planners and liaisons should be assigned. In other theaters or as the campaign develops, it may be necessary to shift integration higher or lower.

Maximizing ISR asset employment and reacting to changes in the weather, the supported unit's plan, or maintenance issues that eliminate ISR support or drastically reduce its availability, requires constant real time management. For this purpose, it is necessary to forward deploy the Intelligence, Surveillance And Reconnaissance Cell (ISARC) and its personnel to each theater to the Joint Task Force level. Currently, there exists only one ISRARC, located at the CAOC, which is responsible for three separate theaters of operations. This naturally reduces the effectiveness of ISARC personnel in administrating the ISR fleet, who are unable to understand the developing situation in each theater to the necessary level of fidelity. By forward deploying an ISARC to each theater, the ISARC would gain invaluable insight into the operational concept of the theater commander, the progress of operations across the battlespace, and the delicate coordination of ISR and operations assets. The ISARC serves as a key component in the command and control of ISR assets, ensuring that all are used to their fullest potential in meeting developing needs across the battlespace. This can only be effectively conducted with significant interaction with the supported theater commander.

Additionally, reach back agencies that provide invaluable long term support and analytical expertise were reorganized to promote habitual relationships. The Air Force Distributed Common Ground Station (DCGS) enterprise, which provides the control, processing and exploitation for the majority of CFACC ISR, geographically designated DGS-1 to focus on Iraq and DGS-2 to focus on Afghanistan. Furthermore, within each DGS, Distributed Ground Station (DGS) Analysis and Reporting Teams (DARTs) were aligned with specific Land Component Command Divisions in theater. Each DART could therefore participate in Division ISR planning, could coordinate in real time with Army organic ISR capabilities, and could develop a better understanding of the requirements and expectations of their supported decision makers.

2. Integrating the Planning and Request Processes

The de-synchronization of the CFLCC and CFACC planning processes has resulted in an excessive emphasis on *ad hoc* re-tasking of ISR assets to meet short-notice Army requirements. While this has generated frustration within the air component from not being able to develop effective and efficient plans, it has also generated friction within the land component as previously requested and planned for ISR enablers were re-directed with little notice to "higher priority" missions. This in turn led to a lack of trust in the air component and a clamoring among ground commanders for either increased organic ISR capabilities or tactical control (TACON) of air component assets when assigned. Overcoming this desynchronization will require improved intermixing of planning and tasking processes to acknowledge supported commander requirements and recognition of the flexibility of CFACC assets to meet a wide range of needs.

Despite the effectiveness of ISR sensors and capabilities, the biggest challenge for Air Force ISR planners and operators will be the coordination of information. Getting the right cues to other sensors, ensuring intelligence information is made available to the right people at the right time, and creating effective communications plans will all prove vital to the success of any mission. The focus of such planning will be on integration, avoiding the treatment of ISR as a separate event but rather as one that feeds into and reacts to the operations plan. Such planning will also be critical in the deconfliction of airspace, the management of effects, and the coordination of "trigger events" in which ISR plays a chief role in informing leadership's decisions to execute or abort the mission. All participants, all stakeholders, must be available and prepared to work in a single combined planning cell for such operations to be successful. During execution, command centers must contain representatives with the authority to adapt effects "on the fly" and capable enough to recognize new opportunities as they present themselves.

Detailed ISR planning, leveraging ISR expertise at the BCT level and drawing upon "reach back" organizations for further support, is essential for the effective and efficient employment of "high demand, low density" ISR assets. ISR planning must anticipate timing considerations (the amount of time to collect intelligence, process it, analyze the information, and disseminate it to the appropriate users) as well as

requirements for ISR Ops/Liaison teams to execute the plan. Planning should, whenever possible, identify specific targets to be collected against and, when not possible, provide named areas of interest to focus collection efforts. Coordination between ISR assets and between ISR and operations will require a carefully constructed communications plan to allow for real time execution of the ISR operation in support of the BCT mission. Lastly, a clear priority of support must be established to identify which units will require ISR support before other units. This identification should also guarantee that the unit has the necessary communications or liaison support to receive available ISR products when needed. The resultant plan should represent a fully integrated product that combines ISR support with maneuver unit schemes of maneuver, fire support plans, and deconfliction from the electronic warfare plan.

In filling collection requests, the collection manager (CM) (with the advice of the ISRLO) must avoid the temptation of spreading ISR across several units to fulfill as many requirements as possible, and instead use a multidisciplinary approach to overcome system limitations and maximize asset utilization. Tasking one asset against one requirement and another asset against a different requirement may be viewed as a means by which to maximize collection, but such a tactic is usually less effective and fails to meet the commander’s needs on both targets. CMs must use their understanding of the commander’s intent and decision making needs to provide the full-spectrum of *effective* ISR to cover the highest priority requirements.

The CM process is the formal structure through which stakeholders manage “high demand, low density” assets. An effective COIN CM process allows the Joint Forces Commander to provide limited assets to priority operations and units while maintaining pressure on insurgent networks and supporting non-kinetic counterinsurgency operations throughout the theater. Only through a carefully structured CM process can plans focused on execution at the BCT level or below receive the full support of integrated kinetic and non-kinetic capabilities.

By dividing the process into operations and ISR functions, integration suffers considerably. This has been highlighted by the difficulties in coordinating the different effects available from assets such as the MQ-1 Predator and MQ-9 Reaper, both of which

have dedicated ISR sensors along with the ability to employ weapons for kinetic effects. Similarly, fighter aircraft equipped with targeting pods have often been used as substitutes for full-motion video (FMV) ISR platforms. The separate tasking processes for close air support (CAS) and ISR has been inefficient, providing little to no oversight over both processes resulting in gaps in coverage or redundancy in effects. When ISR tasking requests are further divided into intelligence disciplines, the chance for seamless employment of all assets into successful mission accomplishment diminishes. Operations and Intelligence must be integrated not only in execution but throughout the planning, requesting, and tasking process.

Recognizing the ability of ISR and operations assets to provide effects within each realm, a new requesting process must be established that ignores the traditional labeling of assets as "strike" or "ISR." The DD Form 1972.1 Joint Integrated Air Support Request (JIASR) provides the coordination required for COIN operation planning. Though based on the Air Support Request used to task Close Air Support missions, the DD Form 1972.1 also serves as a formal means for integrating assets with supported units. Not only does the form provide sections for requesting specific "effects," it also details how assets will communicate with the supported unit, who the point of contact within the unit will be, and it provides the overall concept of operations for all assets.[486] Rather than submitting separate forms for each asset or type of asset (CAS vs. electronic warfare vs. ISR), all requests for support of one operation are submitted via a single form. This form, in turn, provides guidance to supporting units on who to contact within the supported unit for further clarification and a vision for how their effects will be integrated with other supporting and supported elements. Of course, there must be a tasking structure in place that can accept requests that extend beyond the ISR community or outside the CAS community.

The Effects Working Group (EWG) at the BCT level encourages such collaboration. Integrating officers responsible with the different lines of effort (LOE) with their enabling support to include Air Liaison Officers (ALO) and the ISR Liaison

[486] Jeremiah Burgess, e-mail message to author, September 4, 2008.

Officer allows for problem solving to be conducted through discussion and feedback. Furthermore, having the ISRLO present during EWG planning sessions ensures that ISR requirements do not go overlooked and helps to identify ISR opportunities that may not have otherwise been identified by the group. ISR planners must not be sequestered behind the "green door" of secrecy in the special compartmented information facility (SCIF) but must mingle with those decision makers who will draw upon intelligence to inform their choices.[487]

Similarly, the Effects Synchronization Meeting (ESM) at the Division level also strives to best integrate and deconflict ISR and operations needs. By bringing together representatives from each of the BCTs along with the asset managers for CAS, ISR, attack aviation and other "enablers," the ESM is able to eliminate redundancies or conflicts in requests, distribute assets among units, and develop solutions for gaps in coverage using all available capabilities. Unfortunately, such coordination is largely absent in the current Corps asset management construct. An integrated operations-ISR synchronization meeting, an Asset Coordination Meeting (ACM), is required that like the ESM at the Division will be a formally organized network of asset representatives and liaisons from each of the divisions to explain Division and BCT operations and priorities. The ACM would be ideally positioned to mix ISR and operations assets and to ensure effective planning had been conducted to coordinate the employment of these assets by the supported unit. The ACM would also be able to highlight missions that cannot be supported in total and that may require shifting assets to the next highest priority because they have fewer integrated requirements.

3. Shortening the Chain of Approval

Careful planning can produce an executable mission that is not reliant on the ability of select individuals to adapt rapidly in the face of change. Planning, however, cannot predict all obstacles to be encountered, nor can it anticipate the opportunities that may become available during the course of mission execution. Therefore, to make the

[487] Pfeffer, *Managing with Power*, 121.

case to improve the manner in which ISR is planned and tasked is insufficient to truly meet the demands for responsive ISR. ISR planners must take into consideration the need for plans to flex to a developing situation and must ensure that those monitoring the execution of the ISR plan not only have the expertise sufficient to recognize and adapt to that situation but also the authority to direct such actions as necessary. Such individuals will be required both at the tactical level for "terminal coordination" as well as at higher echelons to enable the smoothest modification of target decks and sensor allocation.

A forward deployed ISARC will be essential in the mitigation of conflicts between organizations with regard to adding new targets to the ISR collection deck. While each echelon of decision makers should be responsible for determining the priority of support for their subordinate units, the ISARC will be required to monitor all changes to the ISR plan to ensure that it will not adversely impact the health and welfare of the CFACC enterprise nor will it be detrimental to the next day's flying schedule and that day's supported units. Delegating decision making down to the lowest level and utilizing horizontal rather than vertical coordination links will encourage the most responsive execution of ISR.

Even with the command and control advantages imparted by the forward deployment of the ISARC, it is not clear that ISR employment would be significantly improved. The ISARC provides the ability to re-task assets in response to fleeting targets and to update target decks based on mission developments, but the coordination of ISR assets with operations remains a more tactical issue. Based on current employment, the ISARC does not appear to be able to sufficiently correlate intelligence information among the various ISR platforms. Rather, this task has been undertaken by either ISR crews in the execution of their mission or the supported ground units, which may or may not be continuously monitoring the necessary chat rooms in which intelligence information is reported.

A requirement exists for a single coordinating authority to correlate intelligence data from CFACC and organic assets and to compare it to the developing ground

situation for effective ISR-operations integration.[488] The ISR Effects Coordinator (ISREC) would be tasked with executing ISR operations with assets allocated via the formal ISR tasking process to support a specific tactical operation.[489] This designation, rather than a specific individual, could be transferred among Joint partners as necessary so long as the requirements of being able to communicate with available ISR platforms, interact directly with the supported decision maker, and draw upon a thorough understanding of ISR capabilities and limitations are met. The ISRLO or the senior member of the ILT are the most likely CFACC candidates to serve as the ISREC, particularly because of their location within the supported command post.

The ISRLO functions primarily in a planning and advisement role, providing the CFACC ISR expertise to integrate ISR assets and capabilities into the ground commander's scheme of operations. The ILTs execute the ISR mission in direct coordination with the supported unit and the assigned ISR assets. ILTs would focus not only FMV capabilities but would also provide the point of contact for integrating with Global Hawk and Tactical Reconnaissance (TACRECCE) Direct Support missions, interacting in real time with the divisionally aligned DART, and working with the joint terminal attack controller (JTAC) for non-traditional ISR (NTISR) support from targeting pod equipped fighter aircraft.

The ISRLO, having contributed to the development of the ISR plan, can then provide oversight of the ISR execution, ensuring that the plan is proceeding smoothly and improvising solutions to snags encountered along the way. ISRLO direct oversight of such operations would likely be limited to those missions requiring intensive ISR support. Day-to-day ISR support, typically limited to a few ISR assets at time, would be fully executable by the ILTs and Army ISR Operations Soldiers. In either case, the ISRLO or the senior ILT member could effectively serve as the ISREC, representing the needs of the supported ground commander.

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488 Captain Amanda R. Figueroa, e-mail message to author, September 29, 2009.

489 Ibid.

C. RE-ORIENTATION ON "WICKED" PROBLEMS TO IMPROVE EFFECTIVENESS

Simply delegating planning and command functions of air component assets to subordinate levels to improve timeliness fails to address the greater problems of ISR within a COIN campaign. Organizational re-structuring is a necessary component of meeting the needs of COIN ISR planning, tasking, and execution, but it is not sufficient for alleviating many of the current problems. In fact, while it may be possible to reduce the planning timelines by changing the level of planning and tasking authority, it is unlikely to significantly increase the effectiveness of the limited number of available ISR assets. Making decisions faster improves the responsiveness of ISR, but making the right decisions makes ISR effective. Re-organizing alone could simply lead to making the wrong decisions faster and with frequent, incorrect, course changes. To be both responsive and effective, organizational redesign must be accompanied by a willingness to work with other stakeholders to identify the problem to be resolved and the steps most likely to be successful.

Getting the stakeholders to achieve this shared understanding of the problem and a commitment to its resolution, however, is one of the foremost obstacles to be overcome. This requires allowing the stakeholders to interact directly with one another, to develop an understanding for another's perspectives with regard to the wicked problem, and to work together to find an optimal if not perfect solution. Collaboration and knowledge management should be integrated with "flat" architectures that allow stakeholders access to one another's work. The quality of what could become information overload generally improves as representatives of different stakeholders are able to validate information and resolve discrepancies.

The required dialogue between ISR planners and crews and their supported decision makers must continue into the execution phase of ISR operations. Leveraging technology such as chat and virtual teleconferences, members of the ISR enterprise must remain in constant contact with their joint force partners to understand new developments in the situation, changes to operational objectives, and to deal with unexpected problems. Formal tasking processes that rely on strictly structured request formats and e-mail,

which was designed for the transmitting of data and not for interactive communications, are ill-suited to the needs of wicked problems and the COIN environment.

1. Prioritization Based on Unit Needs vs. Dictated Problem Sets

A change in mindset is necessary to employ ISR effectively in a COIN campaign. ISR can no longer be viewed solely as the domain of the intelligence community but must represent an extension of the ops-intel fusion paradigm. Though the Air Force has long promoted the notion of "effects" over targets, this philosophy must achieve full-functionality by employing ISR assets in a manner that support BCT commanders and operations and does not simply "service targets." To do so, however, requires the cultivation of a shared understanding and collaboration in solving COIN associated ISR problems and recognition that such problems and solutions will be unique to the units encountering them and may not be applicable across the battlespace.

By 2008, the Joint Forces Commander acknowledged that each BCT was dealing with a unique set of obstacles to defeating the insurgency within their area of operations and restoring government capacity in that region. Rather than designate a specific target as a priority to be used across the board, whether it impacted the BCT commanders or not, the JFC instead prioritized which BCTs or operations should receive priority in support.[490] This allows BCT commanders to tackle their local problems as necessary to meet the JFC's overall objective, which is the quelling of the insurgency and the restoration of state services. As the fight becomes less intense in one area or more critical in another, the JFC can shift his priority of effort among those units rather than attempt to identify every potential ISR problem set they might encounter.

As early as 2007, the Corps Collections Management team, made up of joint representatives, developed a solution to the need to prioritize by unit versus target. Originally, FMV assets were treated like any other ISR asset, assigned specific targets to collect against and times during which to do so. When the time was up, the FMV asset moved onto another target, sometimes in the middle of an operation, leaving the

[490] MNC/F-I Collection Manager, e-mail message to author, April 28, 2009.

supported unit without necessary coverage. Recognizing the inflexibility of this process, the Corps CM began to align FMV assets with each Division. Aligned assets are tasked to the Divisions themselves for use on a recurring basis. This allows the Division to then fill requirements submitted by subordinate BCTs with more confidence in the asset's availability. While the Division may choose to re-task the asset to another BCT, the ability to request Corps non-aligned assets often eliminates this requirement and nearly guarantees a BCT that Division-level aligned assets can be counted on to be available as requested. Non-aligned assets are Corps ISR assets used to fill an emerging high priority requirement. Units that receive non-aligned assets do so only for a limited amount of time and with the understanding that the asset could be pulled to fulfill a higher priority tasking.[491]

Another solution, developed by the collection managers at the CAOC ISRD and coordinated with the Division ISRLOs, was the development of "direct support" ISR missions, particularly in the usage of the Global Hawk but later extended, in a limited fashion, to fighters employing TACRECCE pods. During "direct support" missions, the ISR asset is tasked to work directly with a particular unit for a given time. Rather than assigning the ISR asset a deck of targets to be collected, the asset's crew coordinates in real time with the supported unit's ISR team to identify targets as they are required. The supported Army unit would action a target, for example, and as insurgents fled the scene the Army would provide the latest information available. The ISRLO, working in conjunction with the JSTARS, the Warrior Alpha, and the Global Hawk would then coordinate the tracking and locating of the insurgents as they sought cover. The JSTARS would provide updates to the Army ISR Operations officer directing the Warrior Alpha and to the ISRLO who was in contact with the Global Hawk. Each would then provide feedback on what they found or did not find, and the search would continue with information fed to the Army unit for capturing the insurgents.

The alignment of FMV assets with Divisions and the employment of Direct Support missions both assumed a dynamic, changing problem and provided the supported

[491] Odierno, Brooks, and Mastracchio, "ISR Evolution," 53.

commander with the ability to shift ISR collection as necessary. Though the potential exists for ISR assets to be underutilized during such missions, the flexibility and responsiveness accorded is far more in line with the requirements of COIN operations.

2. Shared Understanding of the Mission

Reorganizing the CFACC ISR enterprise will help to align the right people with one another at the best echelons for control and execution, but simply putting organizations together is not enough. ISR personnel must understand the importance of constant dialogue to the successful resolution of the wicked problems encountered in COIN campaigns. Only through such dynamic interactions can ISR truly drive operations, adapt to the changing environment, and effectively shape the battlespace. Decentralization of authority and seamless integration of ISR-operations effects requires a shared understanding of the problem.

Placing CFACC planners at the BCT level to include ISRLOs maintains the CFACC's vision of ISR employment while also managing the interaction of CFACC ISR asset employment with BCT operations.[492] By placing the ISRLO at the BCT level and by integrating the DART into the EWG's planning process, the CFACC can begin planning ISR missions in parallel with, rather than sequentially to, the BCT process while also helping to create shared understandings of the problems with which to be dealt. Furthermore, such direct interaction encourages transparency in the planning and tasking process and gives each component direct insight into the others' decision making processes.[493]

Mission Type Orders (MTOs) use narratives to focus subordinate and supporting unit efforts for effective operations while providing lower-level commanders with the flexibility to execute initiative in accomplishing the commander's intent.[494] Such explicit and implicit guidance, combined with an understanding of what other elements of

492 Anklam, *Network*, 108.

493 Ibid., 97.

494 *Theater ISR CONOPS*, 18.

the mission will be accomplishing, will significantly improve the ISR support provided to the BCT. MTOs typically consist of the commander's intent, the task to be accomplished and the purpose of that task in accomplishing the overall mission but leaves the details of planning and mission execution to tactical commanders and crews.[495] ISR MTOs should be a part of the overall plan to ensure that all elements are aware of the available capabilities on the mission and that sufficient coordination has been made to disseminate information to all those who may require it.

D. CONCLUSION

The U.S. military is likely to continue encountering insurgencies in the future and the U.S. Air Force must embrace its role in COIN operations, developing a coherent, fully developed doctrine for employing dynamic, responsive ISR. The U.S. Air Force should approach the development of a COIN-focused ISR doctrine as a complimentary effort to its traditional role in air dominance during a conventional fight.[496] Without such a doctrine, the Air Force, and its ISR enterprise in particular, will lack the necessary guidance on how to train, equip, and organize for the effective execution of operations in the future.[497] Without a specific written reference, manpower, money, and training will never be sufficiently provided and integrated for this ongoing requirement.

A COIN-focused ISR doctrine will highlight the effects air and space power can bring to the fight. Understanding these capabilities will in turn clarify the types of people and training needed for ISR operations within COIN.[498] A carefully constructed ISR doctrine, as it relates to COIN, will be less about dictating a strict organizational construct and more about embracing the flexibility required to evaluate each theater for the appropriate echelons to which liaison officers are assigned, planners are delegated, and where command and control nodes will be most effective.

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[495] *Theater ISR CONOPS*, 18.

[496] Beebee, "The Air Force's Missing Doctrine," 28.

[497] Ibid.

[498] Ibid., 30.

Ideally, this thesis will serve as a starting point for understanding and developing the required doctrine. In providing an initial foundation by tying together the many combat proven solutions already enacted into a formalized, supportable process that benefits from the synergistic effects of these many efforts, future doctrine writes can further expand this concept. Instead of replacing U.S. Air Force conventional doctrine with that suited only to COIN, the Air Force and its joint partners must replicate the duality of the air tasking methodology as reflected in the air tasking order process and its companion close air support process. A complimentary document to Joint Publication 3–09.3 "Joint Tactics, Techniques, and Procedures for Close Air Support" is required to provide the same level of guidance for "Close ISR Support." Failure to document the hard won lessons of the current fight will leave the CFACC ill-prepared to support future operations and will demand that ISR professionals rediscover lost knowledge.

APPENDIX A. INTELLIGENCE DISCIPLINES

Joint Publication 2–0 *Joint Intelligence* (22 June 2007), provides the following definitions of intelligence disciplines. Additional comments, particularly with regards to intelligence support to counterinsurgency operations have been added and are referenced as appropriate. Unless otherwise specified, all definitions are direct quotes from their sources to prevent contradictions with official doctrine.

A. GEOSPATIAL INTELLIGENCE (GEOINT)

GEOINT is the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the Earth. GEOINT consists of imagery, IMINT, and geospatial information. GEOINT encompasses a range of products from simple IMINT reports to complex sets of layered foundation and intelligence/mission-specific data. GEOINT products are often developed through a “value added” process, in which both the producer and the user of GEOINT update a database or product with current information. Advanced geospatial intelligence (AGI), formerly known as imagery-derived MASINT, includes all types of information technically derived from the processing, exploitation, and non-literal analysis. AGI does not include the MASINT sub-elements of radio-frequency, materials, nuclear radiation, geophysical, or radar not related to synthetic aperture radar. The three components of GEOINT (imagery, IMINT and geospatial information) are discussed below.

The Army implementation of GEOINT is a result of the Army’s organization, manning, and training. There are multiple types of data and information that various Army units and organizations collect, provide, and analyze in order to support the GEOINT enterprise. The two primary GEOINT service providers in the Army are MI units and organizations and Engineer (topographic) units and organizations. MI units and organizations provide imagery and IMINT to the enterprise. Engineer (topographic) units and organizations provide geospatial data and information to the enterprise. Therefore, while some of the collection, analysis, and exploitation of imagery and geospatial

information occur within the intelligence warfighting function; some of the collection, analysis, and exploitation of imagery and geospatial information occur outside intelligence.[499]

(NOTE: An argument can be made that "geospatial intelligence is an all-source technique for synthesizing [intelligence information], not a collection INT."[500] For this reason, this thesis uses the term IMINT vs. GEOINT when discussing the collection discipline.)

a. Imagery is a likeness or presentation of any natural or man-made feature or related object or activity and the positional data acquired at the same time the likeness or representation was acquired, including products produced by space-based national intelligence reconnaissance systems, and likenesses or presentations produced by satellites, airborne platforms, unmanned aerial vehicles, or other similar means (except that such term does not include handheld or clandestine photography taken by or on behalf of HUMINT collection organizations). It is used extensively to update GEOINT foundation data and serves as GEOINT's primary source of information when exploited through IMINT. Imagery comes in two formats: conventional (film-based, hardcopy, sometimes transferred to electronic format) or electronic (digital, softcopy) as either still or motion. Electronic offers many advantages over conventional including improved timeliness, greater dissemination options, and additional imagery enhancement and exploitation capabilities.

b. IMINT is the technical, geographic, and intelligence information derived through the interpretation or analysis of imagery and collateral materials. It includes exploitation of imagery data derived from electro-optical (EO), radar, infrared (IR), multi-spectral, and laser sensors. These sensors produce images of objects optically,

[499] Field Manual 2–0, Intelligence, September 11, 2008, 1–25.

[500] Robert M. Clark, *Intelligence Analysis: A Target Centric Approach* (Washington, DC: CQ Press, 2007), 85.

electronically, or digitally on film, electronic display devices, or other media. The joint force is able to draw support from a number of platforms and sensors with differing capabilities.

(1) EO sensors provide digital imagery data in the IR, visible, and/or ultraviolet regions of the electromagnetic spectrum. EO sensors operating in the visible spectrum can provide a high level of detail or resolution but cannot successfully image a target in darkness or, as with EO sensors in general, bad weather. EO offers many advantages over non-digital (i.e., film-based) systems including improved timeliness, greater dissemination options, imagery enhancement, and additional exploitation methods. (See Figure 49, Example of an Electro-optical Image with Annotations.)

Figure 49. Example of an Electro-optical Image with Annotations[501]

[501] From: AFDD 2–9, 23.

(2) Radar imaging sensors provide all weather imaging capabilities and the primary night capability. Radar imagery is formed from reflected energy in the radio frequency portion of the electromagnetic spectrum. Some radar sensors provide moving target indicator capability to detect and locate moving targets such as armor and other vehicles. (NOTE: The ability to track moving targets via Radar is typically referred to and requested as Ground Moving Target Indicator or GMTI and is treated by this thesis as a unique intelligence discipline.) (See Figure 50, Example Synthetic Aperture Radar imagery.)

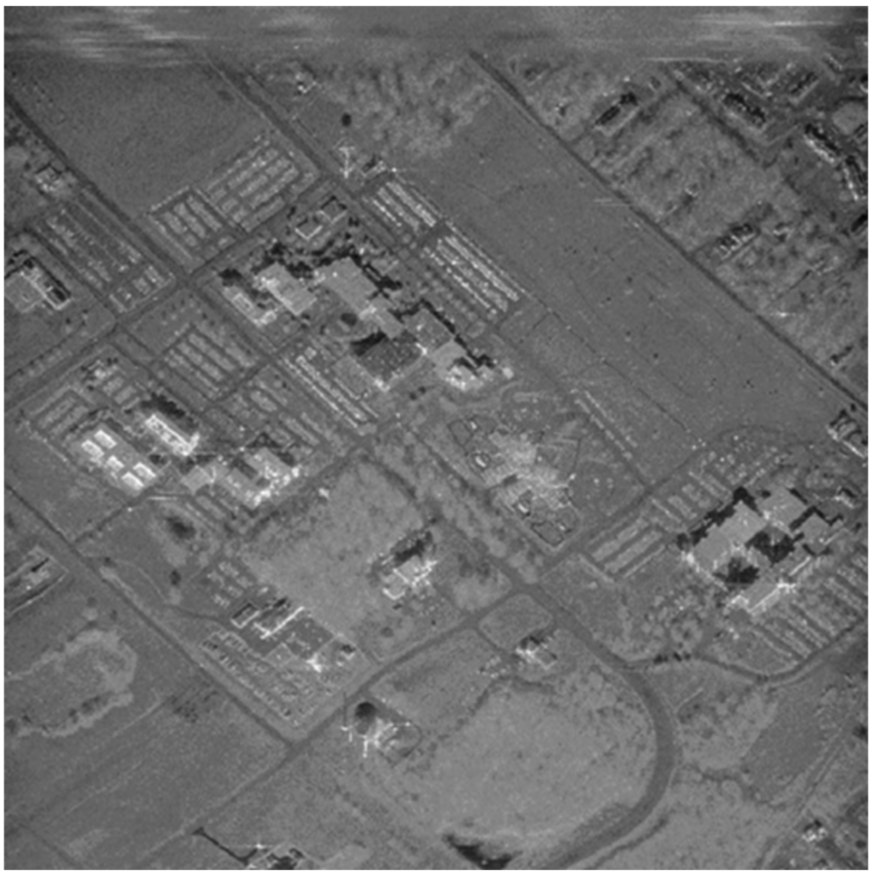

Figure 50. Example Synthetic Aperture Radar imagery[502]

502 From: United States Air Force, "GOTChA, synthetic aperture radar sensor," (media associated with "Data Collection Supports Sensor Development"), http://www.wpafb.af.mil/news/story_media.asp?id=123033809 (accessed November 20, 2009).

(3) IR imaging sensors provide a pictorial representation of the contrasts in thermal IR emissions between objects and their surroundings, and are effective during periods of limited visibility such as at night or in inclement weather. A unique capability available with IR sensing is the ability to capture residual thermal effects. (See Figure 51, Example IR Image.)

Figure 51. Example IR Image[503]

(4) Spectral imagery sensors operate in discrete spectral bands, typically in the IR and visible regions of the electromagnetic spectrum. Spectral imagery is useful for characterizing the environment or detecting and locating objects with known material signatures. Some multispectral imagery (MSI) sensors provide low resolution, large area coverage that may reveal details not apparent in higher resolution EO imagery. Map-like products can be created from MSI data for improved area familiarization and orientation.

503 From: United States Air Force, "Global Hawk, U-2 catches essential wildfires images," (photograph), http://www.af.mil/photos/mediagallery.asp?galleryID=47&page=6 (accessed November 20, 2009). An infrared image, taken by an RQ-4 Global Hawk Unmanned Aerial Vehicle and analyzed for Southern California Firefighters, shows the Horno Fire progressing from left to right with hot areas and objects as white on a darker background.

Hyperspectral imagery (HSI) is derived from subdividing the electromagnetic spectrum into very narrow bandwidths which may be combined with, or subtracted from each other in various ways to form images useful in precise terrain or target analysis. For example, HSI can analyze electromagnetic propagation characteristics, detect industrial chemical emissions, identify atmospheric properties, improve detection of blowing sand and dust, and evaluate snow depths. (See Figure 52, Example Multi-Spectral Image.)

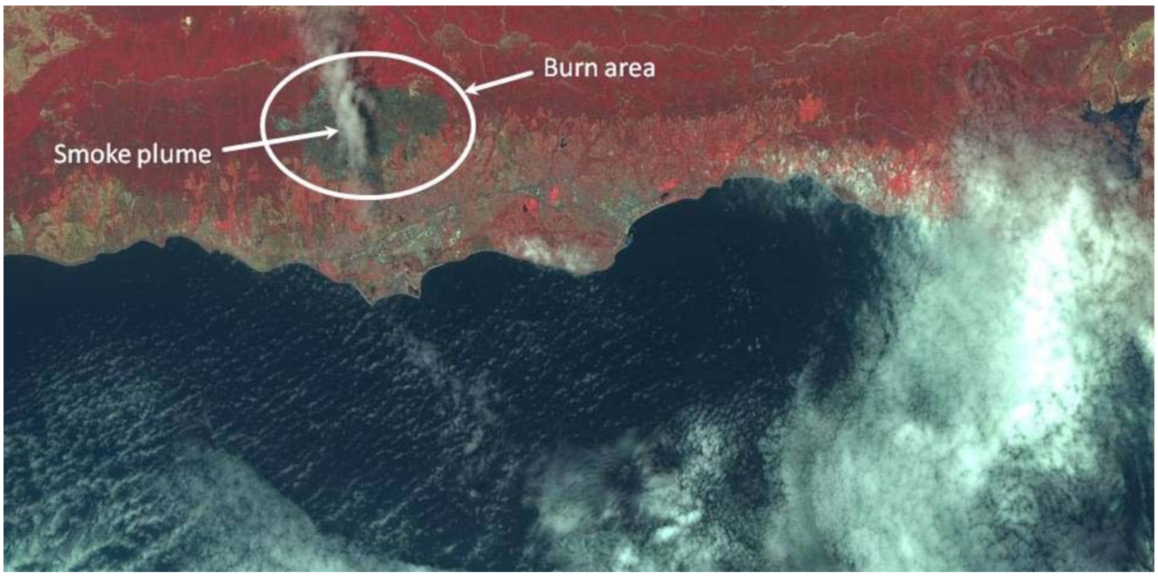

Figure 52. Example Multi-Spectral Image[504]

(5) Full-motion video is a new imagery capability that is shortening the sensor-to-shooter cycle by providing the warfighter imagery in real time. Use of full-motion video provided by RQ-1/MQ-1 Predator unmanned aircraft assists commanders in maintaining situational awareness and identification and tracking of targets, and presents the opportunity for our forces to respond as required.[505] (See Figure 53, Screen Capture of Example Full-Motion Video.)

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[504] From: United States Air Force, "Intel System Gains Warfighting Role," (photograph), http://www.af.mil/shared/media/photodb/photos/090323-F-5136B-450.jpg (accessed November 20, 2009). Taken during the 2008 wildfires in Santa Barbara, Calif shows active fires along with areas that have been burned. Living vegetation is shown in (false) red and burned vegetation is shown in (false) green.

[505] AFDD 2–9, 24.

Figure 53. Screen Capture of Example Full-Motion Video[506]

(6) Non-traditional ISR (NTISR) Resources. With the increasing sophistication of airborne sensors, many, if not all, aircraft can conduct reconnaissance or surveillance to varying degrees, even if intelligence collection is not their primary mission. Some examples of non-traditional capabilities include F-16 tactical airborne reconnaissance systems, F-16CJs collecting SIGINT, F-15Es collecting imagery via their targeting pods, and AC-130s using video capabilities to monitor a particular building. Understanding how to integrate these capabilities into the collection plan is increasingly important, as traditional intelligence collection-only assets can rarely satisfy all collection requirements…collection managers should understand the broad range of collection capabilities associated with such aircraft and, based on this knowledge, articulate the intelligence these assets can provide. Depending on the operation, these assets can be called upon to provide a wide range of intelligence collection support, from providing GEOINT for IPOE, collecting post-strike intelligence for assessment to performing ad hoc collection for emerging threats. The availability of these assets may be haphazard, at

[506] From: PEO Aviation, "Target Feed," (photograph), http://www.army.mil/-images/2007/10/02/8465/size2-army.mil-2007-10-02-101204.jpg (accessed November 20, 2009).

best, and collection managers should have knowledge of the current operational environment to take advantage of these capabilities when they become available.[507] (The most common employment of NTISR assets is as a substitute for FMV capabilities and is therefore included under the GEOINT heading in this appendix.)

c. Geospatial information identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth, including: statistical data; information derived from, among other things, remote sensing, mapping, and surveying technologies; and mapping, charting, geodetic data, and related products. This information is used for military planning, training, and operations including navigation, mission planning and rehearsal, modeling and simulation, and targeting.

GEOINT is addressed in detail in JP 2–03, Geospatial Intelligence Support to Joint Operations.

B. HUMAN INTELLIGENCE

HUMINT is a category of intelligence derived from information collected and provided by human sources. This includes all forms of information gathered by humans, from direct reconnaissance and observation to the use of recruited sources and other indirect means. This discipline also makes extensive use of biometric data (e.g., fingerprints, iris scans, voice prints, facial/physical features) collected on persons of interest. (See Figure 54, Biometric Analysis Tracking System.)

[507] AFDD 2–9, 32–33.

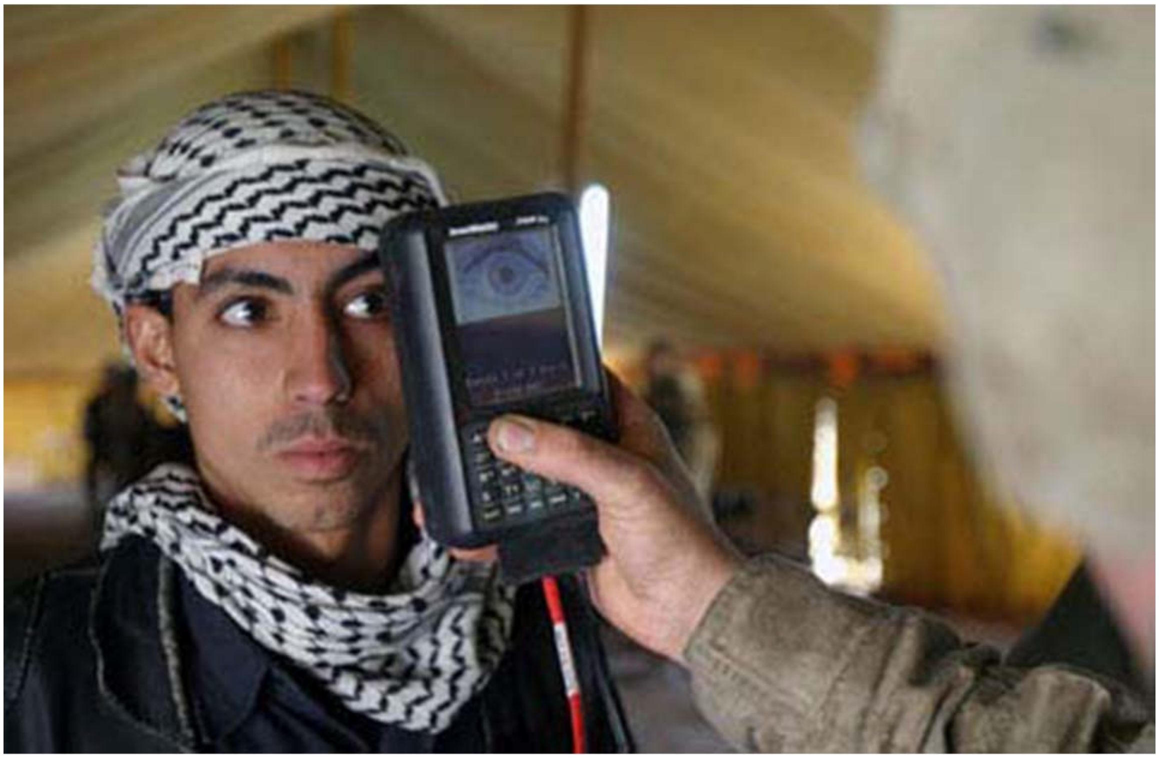

Figure 54. Biometric Analysis Tracking System[508]

a. Interrogation. Interrogation is the systematic effort to procure information to answer specific collection requirements by direct and indirect questioning techniques of a person who is in the custody of the forces conducting the questioning. Proper questioning of enemy combatants, enemy prisoners of war, or other detainees by trained and certified DoD interrogators may result in information provided either willingly or unwittingly. There are important legal restrictions on interrogation and source operations. Federal law and Department of Defense policy require that these operations be carried out only by specifically trained and certified personnel. Violators may be punished under the Uniform Code of Military Justice.

b. Source Operations. Designated and fully trained military HUMINT collection personnel may develop information through the elicitation of sources, to include:

[508] From: JP 2–0, p. I-5. BATS uses thumbprints and facial and retinal scans to identify foreign persons of interest to human intelligence and counter-intelligence personnel.

(1) “Walk-in” sources, who without solicitation make the first contact with HUMINT personnel.

(2) Developed sources that are met over a period of time and provide information based on operational requirements.

(3) Unwitting persons, with access to sensitive information.

c. Debriefing. Debriefing is the process of questioning cooperating human sources to satisfy intelligence requirements, consistent with applicable law. The source usually is not in custody and usually is willing to cooperate. Debriefing may be conducted at all echelons and in all operational environments. Through debriefing, face-to-face meetings, conversations, and elicitation, information may be obtained from a variety of human sources, such as:

(1) Friendly forces personnel, who typically include high-risk mission personnel such as combat patrols, aircraft pilots and crew, long range surveillance teams, and SOF, but can include any personnel with information that can be used for intelligence analysis concerning the adversary or other relevant aspects of the operational environment. Combat intelligence, if reported immediately during an operational mission, can be used to redirect tactical assets to attack enemy forces on a time sensitive basis.

(2) Refugees/displaced persons, particularly if they are from enemy controlled areas of operational interest, or if their former placement or employment gave them access to information of intelligence value.

(3) Returnees, including (returned prisoners of war and defectors, freed hostages, and personnel reported as missing in action).

(4) Volunteers, who freely offer information of value to U.S. forces on their own initiative.

d. Document and Media Exploitation. Captured documents and media, when properly processed and exploited, may provide valuable information such as adversary plans and intentions, force locations, equipment capabilities, and logistical status. The category of “captured documents and media” includes all media capable of storing fixed

information to include computer storage material. This operation is not a primary HUMINT function, but may be conducted by any intelligence personnel with appropriate language support. (See Figure 55, Notional Example of HUMINT Information Combined with GEOINT Data.)

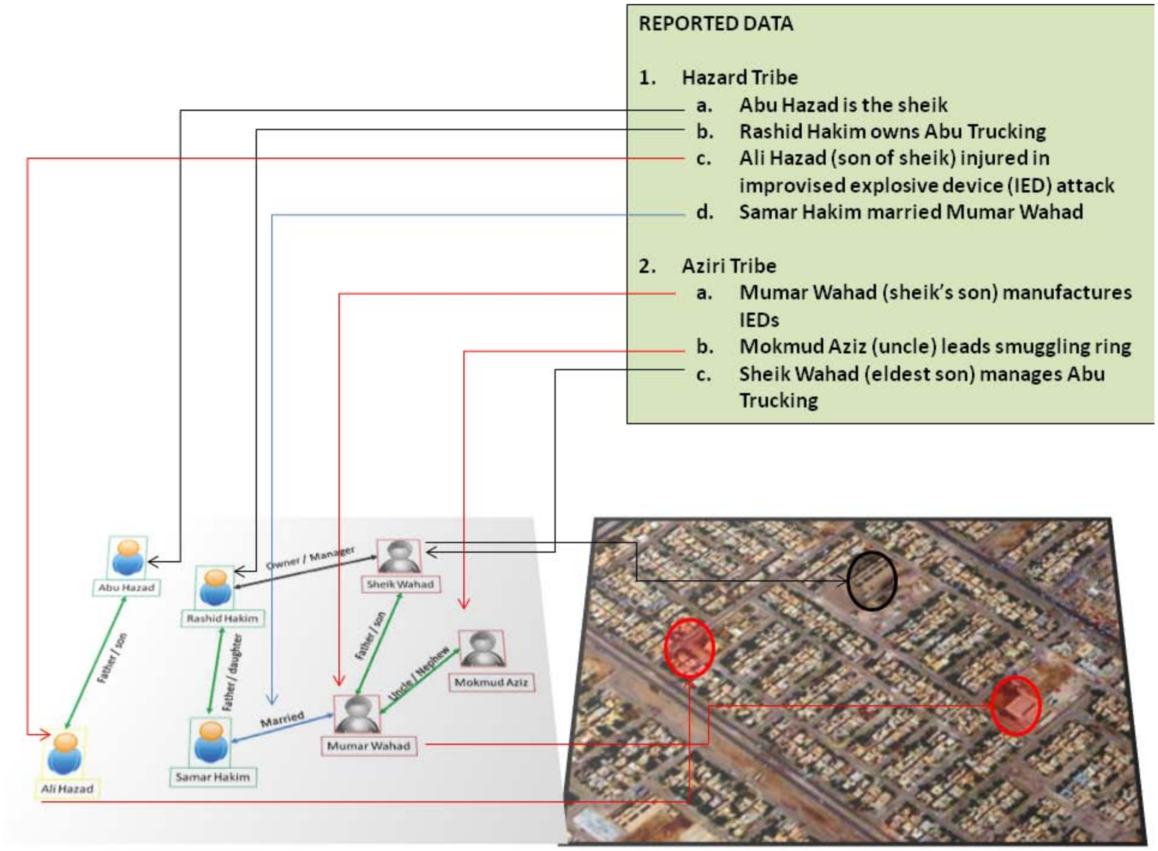

Figure 55. Notional Example of HUMINT Information Combined with GEOINT Data[509]

HUMINT is addressed in detail in JP 2–01.2, Counterintelligence and Human Intelligence Support to Joint Operations.

509 After: JP 3–24, V-9.

C. SIGNALS INTELLIGENCE

SIGINT is intelligence produced by exploiting foreign communications systems and non-communications emitters. SIGINT provides unique intelligence information, complements intelligence derived from other sources and is often used for cueing other sensors to potential targets of interest. For example, SIGINT which identifies activity of interest may be used to cue GEOINT to confirm that activity. Conversely, changes detected by GEOINT can cue SIGINT collection against new targets. The discipline is subdivided into three subcategories: communications intelligence (COMINT), ELINT, and foreign instrumentation signals intelligence (FISINT). (NOTE: "SIGINT is in fact too general a term to use, when in most cases it means COMINT."[510] This comment holds true for current discussions in the field and for this reason, this thesis continues to use the term SIGINT when speaking almost exclusively of COMINT.)

a. COMINT is intelligence and technical information derived from collecting and processing intercepted foreign communications passed by radio, wire, or other electromagnetic means. COMINT includes computer network exploitation, which is gathering data from target or adversary automated information systems or networks. COMINT also may include imagery, when pictures or diagrams are encoded by a computer network/radio frequency method for storage and/or transmission. The imagery can be static or streaming.

b. ELINT is intelligence derived from the interception and analysis of non-communications emitters (e.g., radar). ELINT consists of two subcategories; operational ELINT (OPELINT) and technical ELINT (TECHELINT). OPELINT is concerned with operationally relevant information such as the location, movement, employment, tactics, and activity of foreign non-communications emitters and their associated weapon systems. TECHELINT is concerned with the technical aspects of foreign non-communications emitters such as signal characteristics, modes, functions, associations, capabilities, limitations, vulnerabilities, and technology levels.

[510] Clarke, *Intelligence Analysis,* 85.

c. FISINT involves the technical analysis of data intercepted from foreign equipment and control systems such as telemetry, electronic interrogators, tracking/fusing/arming/firing command systems, and video data links.

D. MEASUREMENT AND SIGNATURE INTELLIGENCE

MASINT is scientific and technical intelligence obtained by quantitative and qualitative analysis of data (metric, angle, spatial, wavelength, time dependence, modulation, plasma, and hydro-magnetic) derived from specific technical sensors for the purpose of identifying any distinctive features associated with the target, source, emitter, or sender. The measurement aspect of MASINT refers to actual measurements of parameters of an event or object such as the demonstrated flight profile and range of a cruise missile. Signatures are typically the products of multiple measurements collected over time and under varying circumstances. These signatures are used to develop target classification profiles and discrimination and reporting algorithms for operational surveillance and weapon systems. The technical data sources related to MASINT include:

a. EO data–emitted or reflected energy across the visible/IR portion of the electromagnetic spectrum (ultraviolet, visible, near IR, and IR).

b. Radar data–radar energy reflected (reradiated) from a target or objective.

c. Radio frequency data–radio frequency/electromagnetic pulse emissions associated with nuclear testing, or other high energy events for the purpose of determining power levels, operating characteristics, and signatures of advanced technology weapons, power, and propulsion systems.

d. Geophysical data–phenomena transmitted through the Earth (ground, water, atmosphere) and man-made structures including emitted or reflected sounds, pressure waves, vibrations, and magnetic field or ionosphere disturbances. Subcategories include seismic intelligence, acoustic intelligence, and magnetic intelligence.

e. Materials data–gas, liquid, or solid samples, collected both by automatic equipment, such as air samplers, and directly by humans.

f. Nuclear radiation data–nuclear radiation and physical phenomena associated with nuclear weapons, processes, materials, devices, or facilities.

E. OPEN-SOURCE INTELLIGENCE

OSINT is based on publicly available information (i.e., any member of the public could lawfully obtain the information by request or observation), as well as other unclassified information that has limited public distribution or access. Examples of OSINT include on-line official and draft documents, published and unpublished reference materiel, academic research, databases, commercial and noncommercial websites, "chat rooms," and web logs ("blogs"). OSINT complements the other intelligence disciplines and can be used to fill gaps and provide accuracy and fidelity in classified information databases. However, caution should be exercised when using OSINT in that open sources may be susceptible to adversary use as a mode of deception (e.g., incorrect information may be planted in public information). All-source intelligence should combine, compare, and analyze classified and open source materiel to provide the full context and scope of the information needed to support U.S. forces.

a. Routine needs for OSINT may be satisfied by querying organization and intelligence community resources to retrieve available information. These resources include commercial on-line information databases and products such as Jane's Yearbooks, Library of Congress country studies, and the NSA telecommunication database, libraries, organization databases containing unclassified information, Internet searches, and the DNI Open Source Center (including the former Foreign Broadcast Information System) products and services.

b. OSINT is very useful during interagency collaboration and in multinational operations where intelligence information based on OSINT sources can be easily shared. However, caution must be exercised to ensure that intelligence sharing arrangements, to include the sharing of OSINT source products, have been approved through the JFC's foreign disclosure office. OSINT can be particularly important during peace operations that place a premium on human factors analysis and data derived from sociological, demographic, cultural, and ethnological studies. By using OSINT to supply basic

information, controlled assets and/or resources and technical systems are freed to be directed against priority intelligence gaps. Open source material is useful in support of all kinds of military operations, and is particularly useful where the U.S. government has minimal or no official presence. For example, DoD intelligence production analysts use open source information on bridge loads, railroad schedules, electric power sources, and other logistics related topics to support U.S. troop transport operations and noncombatant evacuation operations. Understanding the use of deception or misinformation in certain open source media are also key to productive employment of OSINT information.

F. TECHNICAL INTELLIGENCE

TECHINT is derived from the exploitation of foreign materiel and scientific information. TECHINT begins with the acquisition of a foreign piece of equipment or foreign scientific/ technological information. The item or information is then exploited by specialized, multi-Service collection and analysis teams. These TECHINT teams assess the capabilities and vulnerabilities of captured military materiel and provide detailed assessments of foreign technological threat capabilities, limitations, and vulnerabilities.

a. TECHINT products are used by U.S. weapons developers, countermeasure designers, tacticians, and operational forces to prevent technological surprise, neutralize an adversary's technological advantages, enhance force protection, and support the development and employment of effective countermeasures to newly identified adversary equipment. At the strategic level, the exploitation and interpretation of foreign weapon systems, materiel, and technologies is referred to as scientific and technical intelligence (S&TI).

b. The DIA provides enhanced S&TI to CCDRs and their subordinates through the Technical Operational Intelligence (TOPINT) program. TOPINT uses a closed loop system that integrates all Service and DIA S&T centers in a common effort. The TOPINT program provides timely collection, analysis, and dissemination of theater specific S&TI to CCDRs and their subordinates for planning, training, and executing joint operations.

Table 6. Summary of Intelligence Discipline Strengths and Weaknesses

SENSORS	ADVANTAGES	DISADVANTAGES
EO Imagery: Best tool for day, clear weather detailed analysis	• Can identify smuggling routes and safe havens as well as structures of interest or as an aid to urban terrain navigation • Most effective when cross-cued by another source; able to provide visualization of a situation to include deployment of forces, physical obstacles/defenses, and terrain features of an area of interest • Can be used to cross-cue other sources for continuing coverage • Can be effective in detecting changes in patterns or unusual personnel/supply movements • EO imagery can be useful in providing a count of the number of vehicles or personnel in an area of interest or to identify obstacles along the route of travel	• EO imagery is unable to penetrate clouds, haze, fog, precipitation, vegetation or structures and functions only during daylight hours • The better the resolution required, the longer it is likely to take to receive such imagery based on the planning constraints demanded of getting an asset into the right place for the best angle

Table 6 (Continued)

Infrared Imagery: Best tool for night, clear weather detailed analysis	• Can identify smuggling routes and safe havens as well as structures of interest or as an aid to urban terrain navigation • Most effective when cross-cued by another source; able to provide visualization of a situation to include deployment of forces, physical obstacles/defenses, and terrain features of an area of interest • Can be used to cross-cue other sources for continuing coverage • Can be effective in detecting changes in patterns or unusual personnel/supply movements • IR imagery can be useful in providing a count of the number of vehicles or personnel in an area of interest or to identify obstacles along the route of travel	• IR imagery can be impacted by changing temperatures which occur at certain times of the day or be "blinded" by particularly IR significant objects • The better the resolution required, the longer it is likely to take to receive such imagery based on the planning constraints demanded of getting an asset into the right place for the best angle

Table 6 (Continued)

Radar Imagery: Can detect objects at night/in bad weather.	• Radar imagery can typically search large areas and is not susceptible to most weather effects or the time of day; can penetrate some vegetation, camouflage netting, and sometimes the top layer of soil and nonmetallic walls and roofs	• Radar imagery is difficult to interpret and requires trained analysts (may not be particularly useful for providing visualizations to leadership) • Radar imagery is unable to detect personnel, animals, or tents • Radar shadowing can prevent Radar imagery from detecting objects within the shadow • The better the resolution required, the longer it is likely to take to receive such imagery based on the planning constraints demanded of getting an asset into the right place for the best angle
Full Motion Video (FMV): Ideal for monitoring activity, maintaining coverage on mobile targets	• FMV can both be critical in tracking insurgent movements, providing over watch of raids for identifying reinforcement arriving on the objective or for pursuit of "squirters," and to develop pattern of life regarding insurgent movement and activity within a given area • FMV can provide surveillance in areas where it is difficult or impossible, due to terrain or insurgent dominance, to use observation posts	• FMV has a small field of view which prevents the effective search of large areas • FMV should be focused on activities (pattern of life analysis, surveillance of an objective area, or to sanitize routes of travel); collection requests that are focused on static events (such as determining the number of doors/windows into a target compound) are better tasked against (more prevalent) still imagery

Table 6 (Continued)

Ground Moving Target Indicator (GMTI): Best used for tracking moving vehicles in non-urban environments	• GMTI can both be critical in tracking insurgent movements, providing over watch of raids for identifying reinforcement arriving on the objective or for pursuit of "squirters," and to develop pattern of life regarding insurgent movement and activity within a given area • GMTI can provide surveillance in areas where it is difficult or impossible, due to terrain or insurgent dominance, to use observation posts	• GMTI is able to track only radar significant objects and therefore can not track people, animals, and in some cases small vehicles (to include motorcycles) • As GMTI only tracks "radar contacts" it cannot differentiate one contact from another and therefore may lose track of a particular contact when it merges with others (as in high traffic areas) • Radar shadowing can cause a break in tracking for GMTI
Multi-Spectral Imagery (MSI): Provides unique mapping and terrain analysis capabilities	• Spectrum bands can be combined/manipulated to display desired requirements • Images can be merged with other digital imagery to provide higher resolution	• Product not easily interpretable • Requires skilled analysts • Requires large amounts of memory, storage, and processing capabilities

Table 6 (Continued)

Human Intelligence (HUMINT): Typically the best source regarding adversary plans/intentions and on network links	• Document and media exploitation can provide critical information regading insurgent organizations, capabilities, and intentions	• Takes significant amounts of time to collect, requiring source recruitment/infiltration and contact with source • Source training may limit accuracy of information (ability to understand information collected, to provide accurate location data, or to explain complex concepts)
	• Document and media exploitation can be a useful cross-cue for HUMINT collectors in substantiating what detainees know and whether they are telling the truth	• Care must be taken in evaluating source motivation for reporting as it may be used to leverage coalition actions to settle personal vendettas or to embarrass coalition forces • Sources do not always have direct access to required information and may therefore be only to provide incidental information or second-/third-hand accounts
Signals Intelligence (SIGINT): Can provide insight into plans/intentions as well as organization/network structure	• SIGINT is useful in confirming or denying HUMINT reports	• Requires trained linguists in most circumstances • Only effective when adversary is using a means of communication that can be monitored (for example, in effective against couriers or written communications)
	• May be the primary source of intelligence in denied areas (those areas under insurgent control)	• Can be countered by encryption of the communications method (though this will not reduce the effectiveness of signal characteristics or direction finding)

Table 6 (Continued)

Measurement and Signals Intelligence (MASINT):	• Can provide remote monitoring of avenues of approach or border regions for smugglers or insurgents • Can be effective in locating insurgent safe havens and cache sites as well as determining insurgent activities • Specialized imagery products, using MASINT processing, can highlight obstacles to movement • Can be used to detect changes over time and to counter efforts at camouflage, concealment, and deception	• Product not easily interpretable • Requires skilled analysts • Requires large amounts of memory, storage, and processing capabilities
Open Source Intelligence (OSINT)	• Can be more useful than any other discipline in understanding public attitudes or allegiances	• Can often be falsely discredited simply because it was not collected via classified or controlled channels • Sheer volume of available material can overwhelm analysts or provide too many contradicting views to be of utility
Technical Intelligence (TECHINT)	• Insurgents are a "thinking" threat, adapting their tactics, techniques, and procedures to coalition force actions and countermeasures; technical intelligence is vital in understanding the latest technology employed by the insurgents and allows for rapid fielding of new counter-measures	• Requires highly trained and experienced personnel for effective exploitation • May require time intensive collection of sensitive materials in dangerous areas

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APPENDIX B. ISR ASSETS

The following fact sheets have been assembled from official U.S. Air Force, Army and Navy sources to provide familiarity for the ISR assets discussed throughout this thesis. Fact sheets are quoted directly and have only been formatted for continuity. No information has been added or deleted and should therefore not be considered as "confirmation" or "denial" of any capability or lack of capability. Furthermore, this is not an exhaustive list of ISR assets but simply a sampling of those assets referenced within this thesis or common to the theaters of operation.

A. AIR FORCE DISTRIBUTED COMMON GROUND SYSTEM (AF DCGS)[511]

Figure 56. Intelligence Analysts of the AF DCGS[512]

1. MISSION

The Air Force Distributed Common Ground System, or AF DCGS, weapon system is the service's premier globally networked intelligence, surveillance and reconnaissance weapon system. The DCGS produces intelligence information collected by the U-2, RQ-4 Global Hawk, MQ-9 Reaper and MQ-1 Predator.

2. FEATURES

The AF DCGS is currently composed of 20 geographically separated, networked sites. The distributed ground and mission sites are a mixture of active-duty, Air National Guard and Air Force Reserve units working as an integrated combat capability.

The individual weapon system nodes are regionally focused and paired with their corresponding Air Force component numbered air force to provide critical processing, analysis and dissemination of intelligence, surveillance and reconnaissance, or ISR, data collected within the numbered air force's area of responsibility.

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511 "Factsheets: Air Force Distributed Common Ground System," *AF.mil Factsheets,* August 2009, http://www.af.mil/information/factsheets/factsheet_print.asp?fsID=15433&page=1, (accessed 17 Sep 2009).

512 From: "Factsheets: Air Force Distributed Common Ground System", image on page..

However, globally networked capabilities enable the weapon system to execute missions beyond their area of responsibility. Each weapon system is able to accept data from any U-2, RQ-4 Global Hawk, MQ-9 Reaper or MQ-1 Predator operating anywhere in the world and analyze and disseminate accurate and timely intelligence globally.

The weapon system employs global communications architecture to connect multiple intelligence platforms to the Distributed Common Ground System weapon system. The 480th ISR Wing's Operations Center ensures global synchronization for all the sites.

In daily coordination with weapon system liaison officers embedded in the theaters' command and control elements, the 480th ISR wing operations center relies on detailed knowledge of dynamic PED capacities to operationally align regional AF DCGS expertise with specific theater collection priorities and assets. This ensures intelligence missions are executed in keeping with the joint force commander and the joint force component commander-ISR apportionment and allocation to fully satisfy joint and coalition intelligence needs.

AF DCGS currently participates in operations throughout the world including those led by United Nations, North Atlantic Treaty Organization, U.S. Central Command, U.S. European Command, U.S. Forces Korea, U.S. Northern Command, U.S. Pacific Command and U.S. Southern Command operations throughout the world.

3. BACKGROUND

The current AF DCGS concept evolved from many Air Force ISR predecessor programs dating back to the 1960's. The first AF DCGS weapon system, called the Deployable Ground Station-1, or DGS-1, began operations in July 1994. A few short weeks later, the DGS-1 weapon system deployed to Guantanamo Bay, Cuba, in support of military operations in Haiti in August 1994.

The DCGS has evolved from a deployable system into a true distributed ISR operations capability integrating platforms and crews to provide critical intelligence to combat forces down to the warfighters at the lowest level. Over the years, the AF DCGS

weapon system and its predecessor systems have engaged in ISR operations in every major conflict that has had U.S. involvement.

Active-duty systems are assigned to Air Force ISR Agency, with Air National Guard units assigned to their respective states until activated by presidential order. Additional ANG sites are being developed and going into operation. The 480th ISR Wing at Langley AFB, Va., is responsible for executing AF DCGS operations worldwide, including many of the 50 states.

4. GENERAL CHARACTERISTICS

Primary Function: Intelligence, surveillance and reconnaissance

Major System Contractors: Raytheon, Lockheed-Martin, L-3 Communications, Northrop Grumman, Hughes, Goodrich and Houston-Fearless

Major Support Contractors: Northrop Grumman, SAIC, Spectrum, Booz Allen Hamilton and General Dynamics

Processing Capability: Approximately 700 gigabytes of information flow through the 480 IW Wing Operations Center daily--equivalent to more than 700 copies of the Encyclopedia Britannica

Crew: 45 operational crewmembers (U-2 mission); 47 operational crewmembers (RQ-4 mission); seven operational crewmembers (MQ-1/MQ-9 mission). All mission crews are tailored according to mission demands and supported by maintenance, communications and contractor personnel.

Unit Cost: Approximately $750 million (includes facilities, equipment, communications fees, and costs associated with personnel) for a primary weapon system

Initial Operating Capability: The first AF DGS weapon system node (DGS-1): July 1994; DGS-2, July 1995; DGS-3, November 1996; DGS-NV, October 2001; DGS-4, February 2003; DGS-5, October 2004; DGS-KS, July 2006; and DGS-AL and DGS-AR, November 2006.

Inventory: Active force sites, 10; Air Force Reserve sites, 1; ANG sites, 9. Active force sites in development, 4; Reserve sites in development, 1; ANG sites in development, 4.

B. C-130 SCATHE VIEW[513]

Figure 57. C-130 Scathe View[514]

1. MISSION

Provide unobtrusive, long-range, long-loiter collection capability in a permissive environment.

2. FEATURES

Scathe View is composed of a high-endurance, adverse weather-operable, specially modified C-130H aircraft; a roll-on/roll-off sensor control and communications pallet operated by two on-board airborne imagery analysts; and the Wescam MX-15 "pentasensor," a day or night capable imagery sensor with a laser range finder and a laser illuminator. The Scathe View disseminates intelligence data and information directly to ground forces in real time via on-board voice and data communications suites. Employed with the Remote Operations Video Enhanced Receiver (ROVER) system, it can provide still-frame and full-motion video imagery downlink to receiver equipped ground units, complemented by real-time voice communications to the ground. Programmed Tactical Common Data Link and beyond line of sight data communication upgrades will allow for high-quality imagery transmission to ground exploitation units in theater and for worldwide dissemination, respectively. Scathe View and its National Guard crews have

[513] "C-130H Scathe View," *The Air Force Handbook 2007* (Washington DC: U.S. Air Force, 2007), 94.

[514] From: "C-130H Scathe View," 94. The full-motion video ball turret sensor is observable under the nose of the aircraft.

been an essential component of search and rescue, aerial mapping and Humanitarian Relief Operations (HUMRO) during post-Hurricane Katrina operations.

3. GENERAL CHARACTERISTICS

Primary Function: Global airlift

Contractor: Lockheed Martin Aeronautics Company

Power Plant: Four Allison T56-A-15 turboprops; 4,591prop shaft horsepower

Length: 97 feet, 9 inches (29.3 meters)

Height: 38 feet, 10 inches (11. 9 meters)

Wingspan: 132 feet, 7 inches (39.7 meters)

Cargo Compartment: Length, 40 feet (12.31 meters); width, 119 inches (3.12 meters); height, 9 feet (2.74 meters). Rear ramp: length, 123 inches (3.12 meters); width, 119 inches (3.02 meters)

Speed: 366 mph/318 ktas (Mach 0.52) at 20,000 feet (6,060 meters)

Ceiling: 23,000 feet (7,077 meters) with 42,000 pounds (19,090 kilograms) payload.

Maximum Takeoff Weight: 155,000 pounds (69,750 kilograms)

Maximum Allowable Payload: 42,000 pounds (19,090 kilograms)

Maximum Normal Payload: 36,500 pounds (16,590 kilograms)

Range at Maximum Normal Payload: 1,208 miles (1,050 nautical miles)

Range with 35,000 pounds of Payload: 1,496 miles (1,300 nautical miles)

Crew: Five (two pilots, navigator, flight engineer and loadmaster)

Unit Cost: $30.1

Date Deployed: Jun 1974

C. E-8C JOINT STARS[515]

Figure 58. E-8C JSTARS[516]

1. MISSION

The E-8C Joint Surveillance Target Attack Radar System, or Joint STARS, is an airborne battle management, command and control, intelligence, surveillance and reconnaissance platform. Its primary mission is to provide theater ground and air commanders with ground surveillance to support attack operations and targeting that contributes to the delay, disruption and destruction of enemy forces.

2. FEATURES

The E-8C is a modified Boeing 707-300 series commercial airframe extensively remanufactured and modified with the radar, communications, operations and control subsystems required to perform its operational mission. The most prominent external feature is the 27-foot (8 meters) long, canoe-shaped radome under the forward fuselage that houses the 24-foot (7.3 meters) long, side-looking phased array antenna.

The radar and computer subsystems on the E-8C can gather and display detailed battlefield information on ground forces. The information is relayed in near-real time to

515 "Factsheets: E-8C Joint STARS," *AF.mil Factsheets*, September 2007, http://www.af.mil/information/factsheets/index.asp, (accessed 29 May 2009).

516 From: Ricky Best, "Sailing the Skies," (photograph), http://www.af.mil/shared/media/photodb/photos/061130-F-5420B-007.jpg (accessed November 20, 2009).

the Army and Marine Corps common ground stations and to other ground command, control, communications, computers and intelligence, or C4I, nodes.

The antenna can be tilted to either side of the aircraft where it can develop a 120-degree field of view covering nearly 19,305 square miles (50,000 square kilometers) and is capable of detecting targets at more than 250 kilometers (more than 820,000 feet). The radar also has some limited capability to detect helicopters, rotating antennas and low, slow-moving fixed wing aircraft.

As a battle management and command and control asset, the E-8C can support the full spectrum of roles and missions from peacekeeping operations to major theater war.

3. BACKGROUND

Joint STARS evolved from Army and Air Force programs to develop, detect, locate and attack enemy armor at ranges beyond the forward area of troops. The first two developmental aircraft deployed in 1991 to Operation Desert Storm and also supported Operation Joint Endeavor in December 1995.

Joint STARS supported NATO troops over Bosnia-Herzegovina in 1996, Operation Allied Force from February to June 1999, and Operation Enduring Freedom and Operation Iraqi Freedom in 2003.

The 116th Air Control Wing is America's first "Total Force" wing. The former 93rd Air Control Wing, an active-duty Air Combat Command unit, and 116th Bomb Wing, a Georgia Air National Guard unit, were deactivated Oct.1, 2002. The 116th Air Control Wing was activated blending Guard and active-duty Airmen into a single unit.

The 116th ACW is the only unit that operates the E-8C and the Joint STARS mission. The 17th and final E-8C aircraft was delivered on March 23, 2005.

4. GENERAL CHARACTERISTICS

Primary Function: Airborne battle management

Contractor: Northrop Grumman Corp. (primary)

Power Plant: Four Pratt and Whitney TF33–102C

Thrust: 19,200 pounds each engine

Wingspan: 145 feet, 9 inches (44.4 meters)

Length: 152 feet, 11 inches (46.6 meters)

Height: 42 feet 6 inches (13 meters)

Weight: 171,000 pounds (77,564 kilograms)

Maximum Takeoff Weight: 336,000 pounds (152,409 kilograms)

Fuel Capacity: 155,000 (70,306 kilograms)

Payload: electronic equipment and crew

Speed: 449 –587 miles per hour (optimum orbit speed) or Mach 0.52 – 0.65 (390 –510 knots)

Range: 9 hours

Ceiling: 42,000 feet (12,802 meters)

Crew: (flight crew), four; (mission crew) normally 15 Air Force and three Army specialists (crew size varies according to mission)

Unit Cost: $244.4 million (fiscal 98 constant dollars)

Initial operating capability: December 1997

Inventory: Total Force wing, 17; Reserve, 0

D. EP-3E (ARIES II)[517]

Figure 59. EP-3E ARIES II[518]

1. MISSION

Four-engine turboprop signals intelligence (SIGINT) reconnaissance aircraft.

2. FEATURES

The EP-3E ARIES II (Airborne Reconnaissance Integrated Electronic System II) is the Navy's only land-based signals intelligence (SIGINT) reconnaissance aircraft. The 11 aircraft in the Navy's inventory are based on the Orion P-3 airframe and provide fleet and theater commanders worldwide with near real-time tactical SIGINT. With sensitive receivers and high-gain dish antennas, the EP-3E exploits a wide range of electronic emissions from deep within targeted territory.

3. BACKGROUND

During the 1990s twelve P-3Cs were converted to EP3-E ARIES II to replace older versions of the aircraft. The original ARIES I aircraft were converted in the late 1960s and early 1970s. The last EP-3E ARIES II aircraft was delivered in 1997. EP-3Es

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517 "U.S. Navy Fact File: EP-3E," *The U.S. Navy Fact File,* February 17, 2009, http://www.navy.mil/navydata/fact_display.asp?cid=1100&tid=1000&ct=1, (accessed September 17,, 2009).

518 From: United States Navy, "060329-N-9999X-001," (photograph), http://www.navy.mil/management/photodb/photos/060329-N-9999X-001.jpg (accessed November 20, 2009).

have been heavily engaged in reconnaissance in support of NATO forces in Bosnia, joint forces in Korea and in Operation Southern Watch, Northern Watch, and Allied Force.

4. GENERAL CHARACTERISTICS

Primary Function: Signals Intelligence (SIGINT) reconnaissance aircraft.

Contractor: Lockheed Martin Aeronautical Systems Company.

Propulsion: Four Allison T-56-A-14 turboprop engines (4,900 shaft horsepower each).

Length: 116 feet 7 inches (35.57 meters).

Height: 33 feet 7 inches (10.27 meters).

Wingspan: 99 feet 6 inches (30.36 meters).

Weight: Max gross take-off: 139,760 pounds (63,394.1 kg).

Airspeed: 411 knots (466 mph, 745 kph); cruise –328 knots (403 mph, 644 kph).

Ceiling: 28,300 feet (8,625.84 meters).

Range: Maximum mission range –2,380 nautical miles (2,738.9 miles); for three hours on station @1,500 feet –1,346 nautical miles (1,548.97 miles).

Crew: 22+

Unit Cost: $36 million.

E. I-GNAT / WARRIOR ALPHA[519]

Figure 60. I-GNAT[520]

1. MISSION

The I-Gnat-ER system was deployed to Iraq to support CONOPS development for the Extended Range Multi Purpose program (the program of record).

2. FEATURES

The I-Gnat-ER/Warrior Alpha is slightly larger than the Gnat 750, has external hard points, an unencrypted air-to-air data link ability and updated avionics. In FY2005/2006, under direction of the Deputy Secretary of Defense, Satellite Communications (SATCOM) capability for extended range and the 17-inch Raytheon Multi-spectral Targeting System (MTS) sensor/designator was added to the I-Gnat-ER system. This configuration is now referred to as "Warrior Alpha." This system is a multi-mission, multi-payload MTS EO/IR/LASER Range Detector, Designator (LRD) and a SAR UAS capable of operations at medium to high altitudes.

The ER/MP Block 0 aircraft provide additional capabilities over its Block A predecessor to include an HFE that provides additional horsepower, dual surface flight controls, redundant avionics, additional electrical power and Digital Global Positioning System that facilitates an auto-land capability.

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[519] "Improved Gnat Extended Range (I-GNAT ER) 'Warrior Alpha' / Extended Range/Multi-Purpose (ER/MP) Block 0," *FY 2009–2034 Unmanned Systems Integrated Roadmap,* (Washington DC: Department of Defense, April 6, 2009), 61.

[520] From: Ibid.

3. BACKGROUND

The Army acquired three I-Gnat-ER unmanned aircraft and associated support equipment in FY2004 as a result of a Congressional plus up. The I-Gnat-ER system was deployed to Iraq to support CONOPS development for the Extended Range Multi Purpose program (the program of record). In 2007, direction was provided to weaponize the Warrior Alpha which provided a significant combat multiplier and quick response in the field.

To provide a more capable ER/MP variant and provide additional risk reduction for ER/MP, a ER/MP Block 0 production contract was awarded to General Atomics for six aircraft that were delivered in FY08.

4. GENERAL CHARACTERISTICS

Primary Function: Armed reconnaissance, airborne surveillance and target acquisition

Contractor: General Atomics Aeronautical Systems Incorporated

Power Plant: Rotax 914 Turbo

Thrust: 115 hp

Wingspan: 55 ft

Length: 27 ft

Weight: 2300 lb

Payload: 4500 lbs/300 lbs external

Speed (Maximum/Loiter): 120+/70 kts

Range (Direct Line of Sight / Satellite): 250/2500 km

Ceiling: 25,000 ft

F. LITENING AT[521]

Figure 61. LITENING AT Targeting Pod Mounted Under the Air Intake of an F-16[522]

1. MISSION

LITENING Advanced Targeting, or AT, is a precision targeting pod system operational with a wide variety of combat air forces aircraft (A-10A/C, B-52H, F-15E and F-16 Blocks 25-52) as well as aircraft operated by other services and allies (AV-8B, EA-6B, F-16 Block 15 and F/A-18). The system's advanced targeting and image processing technology significantly increases the combat effectiveness of the aircraft during day, night and under-the-weather conditions in the attack of ground targets with a variety of standoff weapons (i.e., laser-guided bombs, conventional bombs and GPS-guided weapons).

2. FEATURES

Mounted externally, LITENING AT is a targeting pod integrated with the aircraft. The targeting pod contains a high-resolution, mid-wave third generation, forward-looking infrared sensor, or FLIR, that displays an infrared image of the target to the aircrew. It has a wide field of view search capability and a narrow field of view acquisition/targeting capability of battlefield-sized targets. The pod contains a charged

521 "Factsheets: LITENING AT," *AF.mil Factsheets*, December 2007, http://www.af.mil/information/factsheets/factsheet_print.asp?fsID=114&page=1, (accessed September 17, 2009).

522 From: United States Air Force, "A LITENING pod," (photograph accompanying story "Team tests pod at LITENING speed"), http://www.af.mil/news/story.asp?storyID=123019183 (accessed November 20, 2009).

coupled device or CCD-TV, camera used to obtain target imagery in the visible portion of the electromagnetic spectrum. An on-gimbal inertial navigation sensor has established line-of-sight and automatic boresighting capability.

The system incorporates a mult-spectral capability with a high resolution, mid-wave, third-generation FLIR and CCD-TV. The pod is equipped with a laser designator for precise delivery of laser-guided munitions and a laser rangefinder for precise target coordinates. For target coordination with ground and air forces, a laser spot tracker, a laser marker, and a fully operational remotely operated video enhanced receiver, or ROVER, compatible video down link improves rapid target detection/ identification.

For ease of maintenance, LITENING AT's modularity, optimal hardware partitioning, and diagnostic capabilities permit true two-level maintenance, eliminating intermediate-level support. Automated built-in test permits a flightline maintainer to isolate and replace a line replaceable unit, or LRU, in under 20 minutes to get the pod back up to full mission capable status. Spares are ordered through a user-friendly website offering in-transit visibility to parts shipment.

3. BACKGROUND

LITENING I was developed for the Israeli air force at Rafael Corporation's Missiles Division in Haifa, Israel. In 1995 Northrop Grumman Corporation's teamed with the company for further development.

LITENING II was initially fielded with Air National Guard and Air Force Reserve Command F-16s in 1999 and employed a "256" FLIR. This was subsequently enhanced to the LITENING Enhanced Range, or ER, configuration by the incorporation of a third-generation "512" FLIR. Subsequent image processing enhancements led to the AT configuration that is now the standard for U.S. forces which began fielding in 2003.

4. GENERAL CHARACTERISTICS

Primary function: Infrared/electro-optical targeting; non-traditional intelligence, reconnaissance and surveillance

Prime Contractor: Northrop Grumman Corporation

Length: 87 inches (2.20 meters)

Diameter: 16 inches (0.406 meters)

Weight: 440 pounds (200 kilograms)

Aircraft: A-10A/A+/C, B-52H, F-15E, F-16 Block 25/30/32/40/42/50/52

Sensors: Infrared detector, CCD-TV camera, laser rangefinder and laser designator

Date Deployed: February 2000

Unit Cost: $1.4 million

G. MC-12 Liberty[523]

Figure 62. MC-12W Liberty[524]

1. MISSION

The MC-12W is a medium–to low-altitude, twin-engine turboprop aircraft. The primary mission is providing intelligence, surveillance and reconnaissance, or ISR, support directly to ground forces. The MC-12W is a joint forces air component commander asset in support of the joint force commander.

2. FEATURES

The MC-12W is not just an aircraft, but a complete collection, processing, analysis and dissemination system. The aircraft are military versions of the Hawker Beechcraft Super King Air 350 and Super King 350ER. A fully operational system consists of a modified aircraft with sensors, a ground exploitation cell, line-of-sight and satellite communications datalinks, along with a robust voice communications suite.

The aircraft is equipped with an electro-optical infrared sensor and other sensors as the mission requires. The EO/IR sensor also includes a laser illuminator and designator in a single sensor package. The MC-12 system is capable of worldwide operations.

523 "Factsheets: MC-12," *AF.mil Factsheets*, August 2009, http://www.af.mil/information/factsheets/factsheet.asp?id=15202, (accessed 03 October 2009).

524 From: Elizabeth Rissmiller, "MC-12 flies first combat mission," (photograph), http://www.af.mil/shared/media/photodb/photos/090610-F-5193R-999.jpg (accessed November 20, 2009).

3. BACKGROUND

The "M" is the Department of Defense designation for a multi-role version of the well known C-12 series. In April 2008, the Secretary of Defense established a DoD-wide ISR Task Force to identify and recommend solutions for increased ISR in the U.S. Central Command area of responsibility. On July 1, 2008, the Secretary of Defense tasked the Air Force to acquire 37 "C-12" class aircraft to augment unmanned systems. Of note, it was less than eight months from funding approval to delivery in the theater.

The MC-12 capability supports all aspects of the Air Force Irregular Warfare mission (counter insurgency, foreign internal defense and building partnership capacity). Medium–to low-altitude ISR is a core mission for the Air Force.

The first MC-12 arrived at Key Field in Meridian, Miss., April 28, 2009. The first MC-12W flew its first combat support sortie on June 12, 2009.

4. GENERAL CHARACTERISTICS

Primary function: Intelligence, surveillance and reconnaissance

Contractor: Hawker Beechcraft Corporation

Power plant: Pratt & Whitney PT6A-60A

Wingspan: 57 feet, 11 inches (17.65 meters)

Length: 46 feet, 8 inches (14.22 meters)

Height: 14 feet, 4 inches (4.37 meters)

Weight: 12,500 pounds empty (5,669 kilograms)

Maximum Takeoff Weight: 350, 15,000 pounds; **350ER**, 16,500 pounds

Fuel capacity: 350, 3,611 pounds (1,638 kilograms); **350ER**, 5,192 pounds (2,355 kilograms)

Speed: 312 knots

Range: 350, 1,500 nautical miles; **350ER**, approximately 2,400 nautical miles

Ceiling: 35,000 feet (10,668 meters)

Armament: none

Crew: Two pilots and two sensor operators

Initial operating capability: June 2009

Unit cost: $17 million (aircraft and all communications equipment modifications)

Inventory: Active force, 37 (planned); Reserve, 0; ANG, 0

H. MQ-1 PREDATOR[525]

Figure 63. MQ-1 Predator Armed with an AGM-114 Hellfire Missile[526]

1. MISSION

The MQ-1 Predator is a medium-altitude, long-endurance, unmanned aircraft system The MQ-1's primary mission is interdiction and conducting armed reconnaissance against critical, perishable targets. When the MQ-1 is not actively pursuing its primary mission, it acts as the Joint Forces Air Component Commander-owned theater asset for reconnaissance, surveillance and target acquisition in support of the Joint Forces commander.

2. FEATURES

The MQ-1 Predator is a system, not just an aircraft. A fully operational system consists of four aircraft (with sensors), a ground control station, a Predator Primary Satellite Link, or PPSL, along with operations and maintenance crews for deployed 24-hour operations.

The basic crew for the Predator is one pilot and two sensor operators. They fly the aircraft from inside the ground control station via a line-of-sight data link or a satellite data link for beyond line-of-sight flight. The aircraft is equipped with a color nose camera

[525] "Factsheets: MQ-1 Predator Unmanned Aircraft System," *AF.mil Factsheets*, September 2008, http://www.af.mil/information/factsheets/index.asp, (accessed May 29, 2009).

[526] From: Leslie Pratt, "MQ-1 Predator," (photograph accompanying story "UAS beta program underway; officials seek more applicants"), http://www.af.mil/news/story.asp?id=123128348 (accessed November 20, 2009).

(generally used by the pilot for flight control), a day variable-aperture TV camera, a variable-aperture infrared camera (for low light/night), and other sensors as the mission requires. The cameras produce full-motion video.

The MQ-1 Predator carries the Multi-spectral Targeting System which integrates electro-optical, infrared, laser designator and laser illuminator into a single sensor package. The aircraft can employ two laser-guided AGM-114 Hellfire anti-tank missiles.

The system is composed of four major components which can be deployed for worldwide operations. The Predator aircraft can be disassembled and loaded into a "coffin." The ground control system is transportable in a C-130 Hercules (or larger) transport aircraft or installed in a fixed facility. The Predator can operate on a 5,000 by 75 feet (1,524 meters by 23 meters), hard surface runway with clear line-of-sight. The ground data terminal antenna provides line-of-sight communications for takeoff and landing. The PPSL provides over-the-horizon communications for the aircraft.

An alternate method of employment, Remote Split Operations, employs a smaller version of the ground control system called the Launch and Recovery GCS, or LRGCS. This sytsem conducts takeoff and landing operations at the forward deployed location while the CONUS based ground control system conducts the mission via extended communication links.

The aircraft includes an ARC-210 radio, an APX-100 IFF/SIF with Mode 4, an upgraded turbo-charged engine and glycol-weeping "wet wings" for ice mitigation. The latest upgrade, which enhances maintenance and performance, includes notched tails, split engine cowling, steel braided hoses and improved engine blocks.

3. BACKGROUND

The "M" is the Department of Defense designation for multi-role and "Q" means unmanned aircraft system. The "1" refers to the aircraft being the first of a series of purpose-built remotely piloted aircraft systems.

The Predator system was designed in response to a Department of Defense requirement to provide persistent intelligence, surveillance and reconnaissance information to the warfighter.

In April 1996, the secretary of defense selected the U.S. Air Force as the operating service for the RQ-1 Predator system. A change in designation from "RQ-1" to "MQ-1" occurred in 2002 with the addition of the armed reconnaissance role.

Operational squadrons are the 15th and 17th Reconnaissance Squadrons at Creech Air Force Base, Nev. The 11th RS provides provides formal upgrade training also at Creech AFB.

4. GENERAL CHARACTERISTICS

Primary Function: Armed reconnaissance, airborne surveillance and target acquisition

Contractor: General Atomics Aeronautical Systems Incorporated

Power Plant: Rotax 914F four cylinder engine

Thrust: 115 horsepower

Wingspan: 48.7 feet (14.8 meters)

Length: 27 feet (8.22 meters)

Height: 6.9 feet (2.1 meters)

Weight: 1,130 pounds (512 kilograms) empty

Maximum takeoff weight: 2,250 pounds (1,020 kilograms)

Fuel Capacity: 665 pounds (100 gallons)

Payload: 450 pounds (204 kilograms)

Speed: Cruise speed around 84 mph (70 knots), up to 135 mph

Range: up to 400 nautical miles (454 miles)

Ceiling: up to 25,000 feet (7,620 meters)

Armament: two laser-guided AGM-114 Hellfire missiles

Crew (remote): Two (pilot and sensor operator)

Initial operational capability: March 2005

Inventory: Active force, 110; ANG, 0; Reserve, 0

I. M/RQ-1C SKY WARRIOR[527]

Figure 64. M/RQ-1C Sky Warrior[528]

1. MISSION

The MQ-1C Extended Range / Multi-Purpose (ER/MP) UAS will provide Division Commanders with a much improved real-time responsive capability to conduct long-dwell, wide-area reconnaissance, surveillance, target acquisition, communications relay, and attack missions.

2. FEATURES

A difference between the ER/MP and preceding models of ER/MP A is its use of a diesel engine to simplify logistics and provide a common fuel on the battlefield. Other major differences from the ER/MP A are: the capability to carry multiple payloads and four Hellfire missiles, the use of a Tactical Common Data Link, Air Data Relay, Manned/Unmanned Teaming, redundant avionics, near all-weather capability, and a One System Ground Control Station that is common to the Hunter and Shadow UAS. The Milestone B decision was made on April 20, 2005, for entry into SDD, with contract award to General Atomics in August 2005 after a competitive down select process. Taking off from an airfield, the ER/MP is operated via the Army's One System GCS and

[527] "MQ-1C Extended Range/Multi-Purpose (ER/MP)," *FY 2009–2034 Unmanned Systems Integrated Roadmap*, (Washington DC: Department of Defense, April 6, 2009), 64.

[528] From: United States Army, "Unmanned aerial vehicles like the Warrior," (photograph accompanying story "Training, UAVs, key to Army aviation in the field"), http://www.army.mil/-images/2009/01/09/28130/army.mil-28130-2009-01-16-200102.jpg (accessed November 20, 2009).

lands via a dual redundant automatic takeoff and landing system. The ER/MP's payload includes Electro-Optical/Infra-Red (EO/IR) and Synthetic Aperture Radar (SAR) with moving target indicator (SAR/MTI) capabilities. Additionally, two 250-pound and two 500-pound hard points under the main wings provide an attack capability.

3. BACKGROUND

Seventeen Single Development Design (SDD) aircraft are being fabricated. Milestone C and LRIP are expected in FY2010. ER/MP UAS will be fielded in the Combat Aviation Brigades in each Army division. Current Future Years Defense Plan (FYDP) funding supports the SDD phase of the UAS in order to progress through the critical design review, design readiness review, fabrication of SDD aircraft and components, Low Rate Initial Production, and Full Rate Production.

4. GENERAL CHARACTERISTICS

Primary Function: Armed reconnaissance, airborne surveillance and target acquisition

Contractor: General Atomics Aeronautical Systems Incorporated

Power Plant: Thielert diesel

Thrust: 135 hp

Wingspan: 56 ft

Length: 28 ft

Weight: 3200 lb (Growth to 3,600 lb)

Payload: 800 lb/500 lb external

Speed (Maximum/Loiter): 150/70 kt

Range (Direct Line of Sight / Satellite): 500/1200 km

Ceiling: 25,000 ft

J. MQ-9 REAPER[529]

Figure 65. MQ-9 Reaper[530]

1. MISSION

The MQ-9 Reaper is a medium-to-high altitude, long endurance unmanned aircraft system. The MQ-9's primary mission is as a persistent hunter-killer against emerging targets to achieve joint force commander objectives. The MQ-9's alternate mission is to act as an intelligence, surveillance and reconnaissance asset, employing sensors to provide real-time data to commanders and intelligence specialists at all levels.

2. FEATURES

The typical system consists of several air vehicles, a ground control station, or GCS, communication equipment/links, spares and people who can be a mix of active-duty and contractor personnel. The crew for the MQ-9 is a pilot and a sensor operator, who operate the aircraft from a remotely located GCS. To meet combatant commanders' requirements, the MQ-9 delivers tailored capabilities using mission kits that may contain various weapons and sensor payload combinations.

529 "Factsheets: MQ-9 Reaper Unmanned Aircraft System," *AF.mil Factsheets*, September 2009, http://www.af.mil/information/factsheets/factsheet_print.asp?fsID=6405&page=1, (accessed 17 Sep 2009).

530 From: Robert W. Valenca, "Showing Off," (photograph), http://www.af.mil/shared/media/photodb/photos/071110-F-1789V-991.jpg (accessed November 20, 2009).

The MQ-9 baseline system has a robust sensor suite for targeting. Imagery is provided by an infrared sensor, a color/monochrome daylight TV and an image-intensified TV. The video from each of the imaging sensors can be viewed as separate video streams or fused with the infrared sensor video. The laser rangefinder/designator provides the capability to precisely designate targets for laser-guided munitions. Synthetic aperture radar will enable Joint Direct Attack Munitions targeting. The aircraft is also equipped with a color nose camera, generally used by the pilot for flight control.

Each MQ-9 aircraft can be disassembled into main components and loaded into a container for air deployment worldwide in Air Force airlift assets such as the C-130 Hercules. The MQ-9 air vehicle operates from standard U.S. airfields.

3. BACKGROUND

The U.S. Air Force proposed the MQ-9 system in response to the Department of Defense request for Global War on Terrorism initiatives. It is larger and more powerful than the MQ-1 Predator and is designed to go after time-sensitive targets with persistence and precision, and destroy or disable those targets. The "M" is the Department of Defense designation for multi-role and "Q" means unmanned aircraft system. The "9" refers to the series of purpose-built remotely piloted aircraft systems.

In July 2004, the Air Combat Command Commander approved the MQ-9 Enabling Concept Document. The MQ-9 is operated by the 42nd Attack Squadron and based at Creech Air Force Base, Nev.

4. GENERAL CHARACTERISTICS

Primary Function: Unmanned hunter/killer weapon system

Contractor: General Atomics Aeronautical Systems, Inc.

Power Plant: Honeywell TPE331–10GD turboprop engine

Thrust: 900 shaft horsepower maximum

Wingspan: 66 feet (20.1 meters)

Length: 36 feet (11 meters)

Height: 12.5 feet (3.8 meters)

Weight: 4,900 pounds (2,223 kilograms) empty

Maximum takeoff weight: 10,500 pounds (4,760 kilograms)

Fuel Capacity: 4,000 pounds (602 gallons)

Payload: 3,750 pounds (1,701 kilograms)

Speed: cruise speed around 230 miles per hour, (200 knots)

Range: 3,682 miles (3,200 nautical miles)

Ceiling: up to 50,000 feet (15,240 meters)

Armament: Combination of AGM-114 Hellfire missiles, GBU-12 Paveway II and GBU-38 Joint Direct Attack Munitions.

Crew (remote): Two (pilot and sensor operator)

Unit Cost: $53.5 million (includes four aircraft with sensors) (fiscal 2006 dollars)

Initial operating capability: October 2007

Inventory: Active force, 10; ANG, 0; Reserve, 0

K. P-3C ORION[531]

Figure 66. P-3C Orion[532]

1. MISSION

Four-engine turboprop anti-submarine and maritime surveillance aircraft.

2. FEATURES

Originally designed as a land-based, long-range, anti-submarine warfare (ASW) patrol aircraft, the P-3C's mission has evolved in the late 1990s and early 21st century to include surveillance of the battlespace, either at sea or over land. Its long range and long loiter time have proved invaluable assets during Operation Iraqi Freedom as it can view the battlespace and instantaneously provide that information to ground troops, especially U.S. Marines.

The P-3C has advanced submarine detection sensors such as directional frequency and ranging (DIFAR) sonobuoys and magnetic anomaly detection (MAD) equipment. The avionics system is integrated by a general purpose digital computer that supports all of the tactical displays, monitors and automatically launches ordnance and provides flight information to the pilots. In addition, the system coordinates navigation information and accepts sensor data inputs for tactical display and storage. The P-3C can carry a mixed payload of weapons internally and on wing pylons.

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[531] "U.S. Navy Fact File: P-3C Orion," *The U.S. Navy Fact File*, February 18, 2009, http://www.navy.mil/navydata/fact_display.asp?cid=1100&tid=1400&ct=1 (accessed September 18, 2009).

[532] From: Richard J. Brunson, "040707-N-6932B-019," (photograph), http://www.navy.mil/management/photodb/photos/040707-N-6932B-019.jpg (accessed November 20, 2009).

3. BACKGROUND

The P-3 Orion has been the Navy's frontline, land-based maritime patrol aircraft since the 1960s. The most capable Orion version is the P-3C, first delivered to the Navy in 1969. The Navy implemented a number of major improvements to the P-3C (Updates I, II, II.5 and III) during its production run. P-3C aircraft communication, navigation, acoustic, non-acoustic and ordnance/weapon systems are still being modernized within several improvement programs to satisfy Navy and joint requirements through the early part of the 21st century.

Current modernization programs include installation of a modernized communications suite, Protected Instrument Landing System, IFF Mode S and Required Navigation Performance Area Navigation, GPS, common avionics improvements and modernized cockpit instrumentation. The USQ-78(V) Upgrade Program is improving the USQ-78(V) Single Advanced Signal Processor system Display Control Unit, a programmable system control processor that provides post processing of acoustic data and is the main component of the Update III acoustic configuration. Up to 100 P-3C aircraft are being upgraded to USQ-78B configuration with System Controller (SC) and Acoustic Sub Unit (ASU) Tech Refreshes. In addition, all analog acoustic data recorders are being replaced with digital data recorders.

Figure 67. Still Frame of Video from P-3C AIP[533]

[533] From: United States Navy, "090409-N-0000X-032," (photograph), http://www.navy.mil/management/photodb/photos/090409-N-0000X-032.jpg (accessed November 20, 2009).

The Critical Obsolescence Program (COP) began in fiscal year 2004 to improve aircraft availability through replacement of obsolete and/or top degrader systems. COP systems include the ARC-230 HF as replacement for the ARC-161, the USQ-130 Data Link as replacement for the ACQ-5, the ASW-60 Autopilot as replacement for the ASW-31, the ASX-6 Multi-Mode Imaging System (MMIS) as replacement for the AAS-36 IRDS and the Telephonics Secure Digital Intercommunications System (SDI) as replacement for the AIC-22 ICS. The Navy has shifted the P-3C's operational emphasis to the littoral regions and is improving the antisurface warfare (ASUW) capabilities of the P-3C. The antisurface warfare improvement program (AIP) incorporates enhancements in ASUW, over-the-horizon targeting (OTH-T) and command, control, communications and intelligence (C4I), and improves survivability. The AIP program presently includes 72 kits on contract; 69 aircraft have been delivered to the fleet as of September 2006. Upgrades to the armament system include the addition of the AGM-84H/K SLAM-ER missile and Mk54 torpedo capabilities.

P-3 mission systems sustainment, necessary to ensure the P-3 remains a viable warfighter until P-8A Poseidon achieves full operational capability (FOC), include acoustic processing upgrades through air acoustic rapid COTS insertion (ARCI) and tech refreshes, mission systems obsolescence management, and the upgrade of P-3 tactical communications and networking through over-the-horizon C4I international marine/maritime satellite (INMARSAT).

The ongoing P-3C airframe sustainment program inspects and repairs center and outer wings while reducing Fleet inventory to the mandated 130 aircraft by 2010. The P-3C fleet has experienced significant fatigue degradation over its operational life as quantified through the Service Life Assessment Program (SLAP). The Navy has instituted special structural inspections programs and replacement kits to refurbish aircraft structures to sustain airframe life. The 12 active patrol squadrons (down from 24 in 1991) operate P-3C AIP and Update III configured aircraft. Other P-3 variants still in service include one VP-3A executive transport, four NP-3C and eight NP-3D research and development, testing and evaluation and oceanographic survey aircraft. Numerous

countries also fly the P-3 Orion, making it one of the more prevalent Navy aircraft available for foreign military sales and support.

4. GENERAL CHARACTERISTICS

Primary Function: Antisubmarine warfare(ASW)/Antisurface warfare (ASUW).

Contractor: Lockheed Martin Aeronautical Systems Company.

Date Deployed: First flight, November 1959; Operational, P-3A August 1962 and P-3C August 1969.

Unit Cost: $36 million.

Propulsion: Four Allison T-56-A-14 turboprop engines (4,600 hp each)

Length: 116.7 feet.

Height: 33.7 feet.

Wingspan: 99.6 feet.

Weight: Maximum takeoff, 139,760 pounds

Airspeed: Maximum, 411 knots; cruise, 328 knots

Ceiling: 28,300 feet.

Range: Mission radius, 2,380 nautical miles; for three hours on-station at 1,500 feet, 1,346 nautical miles.

Crew: (P-3C) three pilots, two naval flight officers, two flight engineers, three sensor operators, one in-flight technician.

Armament: 20,000 pounds of ordnance, including AGM-84 Harpoon, AGM-84E SLAM, AGM-84H/K and AGM-65F Maverick missiles, Mk46/50/54.

L. RC-135V/W RIVET JOINT[534]

Figure 68. RC-135V/W Rivet Joint[535]

1. MISSION

The RC-135V/W Rivet Joint reconnaissance aircraft supports theater and national level consumers with near real time on-scene intelligence collection, analysis and dissemination capabilities.

2. FEATURES

The aircraft is an extensively modified C-135. The Rivet Joint's modifications are primarily related to its on-board sensor suite, which allows the mission crew to detect, identify and geolocate signals throughout the electromagnetic spectrum. The mission crew can then forward gathered information in a variety of formats to a wide range of consumers via Rivet Joint's extensive communications suite.

The interior seats more than 30 people, including the cockpit crew, electronic warfare officers, intelligence operators and in-flight maintenance technicians.

The Rivet Joint fleet was re-engined with CFM-56 engines with an upgraded flight deck instrumentation and navigational systems to FAA/ICAO standards. These standards include conversion from analog readouts to a digital "glass cockpit" configuration.

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534 "Factsheets: RC-135V/W Rivet Joint," *AF.mil Factsheets*, September 2008, http://www.af.mil/information/factsheets/index.asp, (accessed 29 March 2009).

535 From: United States Air Force, "RC-135V/W," (photograph accompanying RC-135 fact sheet), http://www.af.mil/shared/media/factsheet/rc135.jpg (accessed November 20, 2009).

All Rivet Joint airframe and mission systems modifications are overseen by L-3 Communications (previously Raytheon), under the oversight of Air Force Materiel Command.

3. BACKGROUND

The current RC-135 fleet is the latest iteration of modifications to this pool of -135 aircraft going back to 1962. Initially employed by Strategic Air Command to satisfy nationally tasked intelligence collection requirements, the RC-135 fleet has also participated in every sizable armed conflict involving U.S. assets during its tenure.

RC-135s were present supporting operations in Vietnam, the Mediterranean for Operation El Dorado Canyon, Grenada for Operation Urgent Fury, Panama for Operation Just Cause, and Southwest Asia for operations Desert Shield, Desert Storm, Enduring Freedom and Iraqi Freedom. RC-135s have maintained a constant presence in Southwest Asia since the early 1990s.

All RC-135s are assigned to Air Combat Command. The RC-135 is permanently based at Offutt Air Force Base, Neb., and operated by the 55th Wing, using various forward deployment locations worldwide.

4. GENERAL CHARACTERISTICS

Primary Function: Reconnaissance

Contractor: L-3 Communications

Power Plant: Four CFM International F108-CF-201 high bypass turbofan engines

Thrust: 21,600 pounds each engine

Wingspan: 131 feet (39.9 meters)

Length: 135 feet (41.1 meters)

Height: 42 feet (12.8 meters)

Weight: 173,000 pounds (78,743 kilograms)

Maximum Takeoff Weight: 297,000 pounds (133,633 kilograms)

Fuel Capacity: 130,000 pounds (58,967 kilograms)

Speed: 500+ miles per hour (Mach.66)

Range: 3,900 miles (6,500 kilometers)

Ceiling: 50,000 feet (15,240 meters)

Crew: (flight crew) five (augmented) –three pilots, two navigators; (mission flight crew) 21-27, depending on mission requirements, minimum consisting of three electronic warfare officers, 14 intelligence operators and four inflight/airborne maintenance technicians

Unit Cost: unavailable

Initial operating capability: January 1964

Inventory: Active force, 17; Reserve, 0; Guard, 0

M. RQ-4 GLOBAL HAWK[536]

Figure 69. RQ-4 Global Hawk[537]

1. MISSION

The RQ-4 Global Hawk is a high-altitude, long-endurance unmanned aircraft system with an integrated sensor suite that provides intelligence, surveillance and reconnaissance, or ISR, capability worldwide. Global Hawk's mission is to provide a broad spectrum of ISR collection capability to support joint combatant forces in worldwide peacetime, contingency and wartime operations. The Global Hawk complements manned and space reconnaissance systems by providing near-real-time coverage using imagery intelligence or IMINT, sensors.

2. FEATURES

The Global Hawk system consists of the RQ-4 aircraft, mission control element, or MCE, launch and recovery element, or LRE, sensors, communication links, support element and trained personnel. The IMINT sensors include synthetic aperture radar, electro-optical and medium-wave infrared sensors. The system offers a wide variety of employment options. The long range and endurance of this system allow tremendous flexibility in meeting mission requirements.

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[536] "Factsheets: RQ-4 Global Hawk Unmanned Aircraft System," *AF.mil Factsheets*, October 2008, http://www.af.mil/information/factsheets/index.asp, (accessed 29 May 2009).

[537] From: Bobbi Zapka, "Global Hawk flying environmental mapping missions in Latin America, Caribbean," (photograph), http://www.af.mil/shared/media/photodb/photos/070301-F-9126Z-229.jpg (accessed November 20, 2009).

The Global Hawk will eventually carry the airborne signals intelligence payload. One version of Global Hawk will carry the Radar Technology Insertion Program active electronically scanned array radar.

The MCE serves as the Global Hawk cockpit during the operational portion of the mission with a pilot and sensor operator crew. Command and control data links provide the Global Hawk crew complete dynamic control of the aircraft. The pilot workstations in the MCE and LRE act as the cockpit on the ground for the pilot to control and display platform status transmitted from the aircraft via the command and control link (health and status of the aircraft, sensors, navigational systems and communication links). From this station, the pilot communicates with outside entities to coordinate the mission (air traffic control, airborne controllers, ground controllers, other ISR assets, etc.). When necessary the pilot can land the aircraft at any location provided in the aircraft mission plan. The sensor operator workstation manually provides the capability to dynamically update the collection plan, monitor sensor status, initiate sensor calibration and process, distribute, and store data. The sensor operator provides quality control of images on selected targets of high interest (ad hoc, dynamic targets, etc.)

The LRE, located at the aircraft base, launches the aircraft until handoff to the MCE contains functions required to launch, recover and operate an aircraft while en route to or from the target area. The LRE contains one pilot station providing the capability to operate one aircraft with no sensor operations.

3. BACKGROUND

Global Hawk began as an Advanced Concept Technology Demonstration in 1995. The system was determined to have military utility and provide warfighters with a high-altitude, long-endurance ISR capability. While still a developmental system, Global Hawk deployed operationally to support the global war on terrorism in November 2001.

In the RQ-4 name, the "R" is the Department of Defense designation for reconnaissance and "Q" means unmanned aircraft system. The "4" refers to the series of purpose-built remotely piloted aircraft systems.

The Global Hawk UAS provides near-continuous all-weather, day/night, wide area surveillance and will eventually replace the U-2. The Global Hawk is operated by the 12th Reconnaissance Squadron. The 1st RS provides formal training; both squadrons are located at Beale Air Force Base, Calif.

4. GENERAL CHARACTERISTICS

Primary function: High-altitude, long-endurance intelligence, surveillance and reconnaissance

Contractor: Northrop Grumman (Prime), Raytheon, L3 Comm

Power Plant: Rolls Royce-North American AE 3007H turbofan

Thrust: 7,600 pounds

Wingspan: (RQ-4A) 116 feet (35.3 meters); (RQ-4B) 130.9 feet (39.8 m)

Length: (RQ-4A) 44 feet (13.4 meters); RQ-4B, 47.6 feet (14.5 meters)

Height: RQ-4A 15.2 (4.6 meters); RQ-4B, 15.3 feet (4.7 meters)

Weight: RQ-4A, 11,350 pounds (5,148 kilograms); RQ-4B, 14,950 pounds (6,781 kilograms)

Maximum takeoff weight: RQ-4A, 26,750 pounds (12,133 kilograms); RQ-4B, 32,250 pounds (14628 kilograms)

Fuel Capacity: RQ-4A, 15,400 pounds (6,985 kilograms); RQ-4B, 17,300 pounds (7847 kilograms)

Payload: RQ-4A, 2,000 pounds (907 kgs); RQ-4B, 3,000 lbs (1,360 kgs)

Speed: RQ-4A, 340 knots (391 mph); RQ-4B, 310 knots (357 mph)

Range: RQ-4A, 9,500 nautical miles; RQ-4B, 8,700 nautical miles

Ceiling: 60,000 feet (18,288 meters)

Crew (remote): Three (LRE pilot, MCE pilot and sensor operator)

Unit Cost: RQ-4A, $37.6 million; RQ-4B, $55-$81 million

Initial operating capability: fiscal 2012

Inventory: Active force, RQ-4A: 7; RQ-4B: 3

N. RQ/MQ-5 HUNTER[538]

Figure 70. MQ-5 Hunter with Under Wing Mounted Armament[539]

1. MISSION

Short-range Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR) UAV.

2. FEATURES

The MQ 5Bs are modified with integration of heavy fuel engines (HFE), upgraded avionics, and with the addition of an extended center wing, are capable of carrying munitions. An ARC-210 Communications Relay Payload package is also available to provide range extension for voice communications. The MQ-5B aircraft is operated and controlled by the One System Ground Control Station (OSGCS).

3. BACKGROUND

The RQ-5A Hunter originated as a Joint Army/Navy/Marine Corps UAS program. It was terminated in 1996, but through the procurement of a limited number of LRIP systems, Hunter continues to provide a valuable asset to the Warfighter today. It is currently fielded to INSCOM MI units (Alpha Co 15th MI, Alpha Co 224th Mi and Alpha Co 1st MI and the Training and Doctrine Command (TRADOC) training base. Hunter deployed to Macedonia to support North Atlantic Treaty Organization (NATO) Balkan operations in 1999 through 2002 and to Iraq in 2003 and to Afghanistan 2008 where it continues to be used extensively to support combat operations. The

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538 "MQ-5B Hunter," *FY 2009–2034 Unmanned Systems Integrated Roadmap*, (Washington DC: Department of Defense, April 6, 2009), 65.

539 From: "MQ-5B Hunter," 65.

modernization and retrofit of the original RQ-5A to the MQ-5B was initiated in FY2004. The RQ-5As and MQ-5As were phased out of service as units were fielded the MQ-5Bs. Hunter aircraft have accumulated over 62,000 flight hours.

4. GENERAL CHARACTERISTICS

Primary Function: Short-range Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR) UAV.

Contractor: Northrop Grumman Corporation

Power Plant: Two 50.7 kW (68 hp) Moto Guzzi two-cylinder four-stroke engines initially, one at front and one at rear of fuselage nacelle; two-blade wooden propellers (one tractor, one pusher). Fuel capacity 189 litres (50 U.S. gallons; 41.6 Imp gallons). Mogas or heavy-fuel engines. Increased fuel capacity in larger wings.

Wingspan: RQ-5A: 8.84m (29ft), MQ-5B: 10.44m (34ft 3.0in), MQ-5C: 16.61m (54 ft 6.0in)

Length: RQ-5A/MQ-5B: 7.01m (23ft), MQ-5C: 7.47m (24ft 6in)

Height: 1.65 m (5 ft 5.0 in)

Weight: 540 kg (1,190 lb)

Maximum Takeoff Weight: 726 kg (1,600 lb)

Fuel Capacity: 136 kg (300 lb)

Payload: Internal: 113 kg (250 lb), external: 118 kg (260 lb)

Speed: RQ-5A: 110kt, MQ-5B/C: 120kt

Range: >108nm

Ceiling: RQ-5A: 4,575m (15,000ft), MQ-5B: >6,100m (20,000ft), MQ-5C: >7,620m (25,000ft)

O. RQ-7 SHADOW 200[540]

Figure 71. RQ-7 Shadow 200[541]

1. MISSION

Surveillance and target acquisition UAV.

2. FEATURES

The Shadow is rail-launched via catapult system. It is operated via the Army's One System GCS and lands via an automated takeoff and landing system (recovering with the aid of arresting gear) and net. Its gimbaled upgraded plug-in optical payload (POP) 300 EO/IR sensor relays video in real time via a C-band LOS data link and has the capability for IR illumination (laser pointing).

3. BACKGROUND

The Army selected the RQ-7 Shadow 200 (formerly a Tactical Unmanned Air Vehicle [TUAV]) in December 1999 to meet the Brigade-level unmanned aircraft requirement for support to ground maneuver commanders. The first upgraded B model was delivered in August 2004 and the fleet conversion to the B model was completed the fall of 2006. The RQ-7B has an endurance of five to six hours on-station (greater fuel capacity), upgraded engine, and improved flight computer. Full-rate production and IOC

[540] "RQ-7 Shadow 200," *FY 2009–2034 Unmanned Systems Integrated Roadmap*, (Washington DC: Department of Defense, April 6, 2009), 75.

[541] From: Justing Naylor, "Spc. Stephen Heinz," (photograph accompanying story "The 'eye in the sky' keeps Soldiers out of harm's way"), http://www.army.mil/-news/2009/04/28/20294-the-eye-in-the-sky-keeps-soldiers-out-of-harms-way/index.html (accessed November 20, 2009).

occurred in September 2002. Future upgrades include complete TCDL modernizations and laser designation technology. Shadow systems have been deployed to Iraq and Afghanistan in support of the Global War on Terrorism (GWOT) and have accumulated more than 327,000 combat flight hours as of November 2008. The Marine Corps selected the Shadow to replace its Pioneer UAS in 2006.

4. GENERAL CHARACTERISTICS

Primary Function: Surveillance and target acquisition UAV.

Contractor: AAI

Power Plant: One 28.3 kW UEL AR 741 rotary engine (RQ-7A and B); two-blade fixed-pitch wooden pusher propeller.

Thrust: 38 hp

Wingspan: RQ-7A: 3.89m (12ft 9in), RQ-7B: 4.29m (14ft 1in)

Length: 3.40 m (11 ft 2.0 in)

Height: 0.91 m (3 ft 0.0 in)

Weight: 91.0 kg (200.6 lb)

Maximum Takeoff Weight: RQ-7A: 154kg (340lb), RQ-7B: 170kg (375lb)

Fuel Capacity: Fuel (40 litres; 10.5 U.S. gallons; 8.7 Imp gallons in RQ-7A) in fire-retardant, explosion-proof wing cells; increased to 57 litres (15.0 U.S. gallons; 12.5 Imp gallons in RQ-7B). Growth option for eventual heavy fuel power plant.

Payload: RQ-7A: 25.3 kg (55.7 lb), RQ-7B: 20.4-27.2 kg (45-60 lb)

Speed: RQ-7A: 123 kt (228 km/h; 141 mph), RQ-7B: 118 kt (218 km/h; 135 mph)

Range: 43 n miles (80 km; 69 miles)

Ceiling: 4,575 m (15,000 ft)

P. THEATRE AIRBORNE RECONNAISSANCE SYSTEM (TARS)[542]

Figure 72. TARS Mounted Under F-16[543]

1. MISSION

Provide warfighting theaters with organic, survivable, and responsive penetrating tactical reconnaissance that gathers timely, high-quality imagery intelligence data for use by commanders in the air-land battle.

2. FEATURES

The F16-TARS (Theater Airborne Reconnaissance System) consists of a removable pod uploaded to F-16C Block 25/30/32 aircraft. TARS is the Air Force's only high-speed, penetrating, under-the-weather, theater-controlled, reconnaissance capability. In the span of a single engagement, it provides unique rapid strike and reconnaissance in a high-threat environment. Per the 2004 operational requirements document and as requested by CENTAF, TARS must provide near-real-time imagery transmission to forces on the ground, allowing immediate response to threats and battle damage assessment (BDA). Continuously deployed in Iraq since May 2005, TARS has significantly increased imagery available in Operation Iraqi Freedom (OIF) by producing over 6,000 images for CENTCOM in support of infantry and special operations personnel

542 "F-16-TARS Theater Airborne Reconnaissance System," *The Air Force Handbook 2007,* (Washington DC: U.S. Air Force, 2007), 144.

543 From: "F-16 TARS Theater Airborne Reconnaissance System," 144. TARS pod, circled in red, mounted under the F-16 between the rear landing gear.

engaged in counter-insurgent pre-raid planning, time-sensitive targeting, BDA, and counter-IED support. Data link capability will begin limited fielding in FY07common datalink installed.

Q. U-2S/TU-2S[544]

Figure 73. U-2S Dragon Lady[545]

1. MISSION

The U-2 provides high-altitude, all-weather surveillance and reconnaissance, day or night, in direct support of U.S. and allied forces. It delivers critical imagery and signals intelligence to decision makers throughout all phases of conflict, including peacetime indications and warnings, low-intensity conflict, and large-scale hostilities.

2. FEATURES

The U-2S is a single-seat, single-engine, high-altitude/near space reconnaissance and surveillance aircraft providing signals, imagery, and electronic measurements and signature intelligence. Long and narrow wings give the U-2 glider-like characteristics and allow it to quickly lift heavy sensor payloads to unmatched altitudes, keeping them there for extended periods of time. The U-2 is capable of gathering a variety of imagery, including multi-spectral electro-optic, infrared, and synthetic aperture radar products which can be stored or sent to ground exploitation centers. In addition, it also supports high-resolution, broad-area synoptic coverage provided by the optical bar camera producing traditional film products which are developed and analyzed after landing.

The U-2 also carries a signals intelligence payload. All intelligence products except for wet film can be transmitted in near real-time anywhere in the world via air-to-

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[544] "Factsheets: U2S/TU-2S," *AF.mil Factsheets,* September 2007, http://www.af.mil/information/factsheets/index.asp, (accessed May 29, 2009).

[545] From: United States Air Force, "CENTAF Air Power Summary for April 3,2007," (photograph), http://www.af.mil/shared/media/photodb/photos/030411-F-0000J-222.jpg, (accessed November 20, 2009).

ground or air-to-satellite data links, rapidly providing critical information to combatant commanders. Measurement and signature intelligence provides indications of recent activity in areas of interest and reveals efforts to conceal the placement or true nature of man-made objects.

Routinely flown at altitudes over 70,000 feet, the U-2 pilot must wear a full pressure suit similar to those worn by astronauts. The low-altitude handling characteristics of the aircraft and bicycle-type landing gear require precise control inputs during landing; forward visibility is also limited due to the extended aircraft nose and "taildragger" configuration. A second U-2 pilot normally "chases" each landing in a high-performance vehicle, assisting the pilot by providing radio inputs for altitude and runway alignment. These characteristics combine to earn the U-2 a widely accepted title as the most difficult aircraft in the world to fly.

The U-2 is powered by a General Electric F118-101 engine, fuel efficient and lightweight, which negates the need for air refueling on long duration missions. The U-2S Block 10 electrical system upgrade replaced legacy wiring with advanced fiber-optic technology and lowered the overall electronic noise signature to provide a quieter platform for the newest generation of sensors.

The aircraft has these sensors: electro-optical infrared camera, optical bar camera, advanced synthetic aperture radar, signals intelligence, and network-centric communication.

A U-2 Reliability and Maintainability Program provided a complete redesign of the cockpit with digital color multifunction displays and up-front avionics controls to replace the 1960s-vintage round dial gauges which were no longer supportable.

3. BACKGROUND

Built in complete secrecy by Kelly Johnson and the Lockheed Skunk Works, the original U-2A first flew in August 1955. Early flights over the Soviet Union in the late 1950s provided the president and other U.S. decision makers with key intelligence on Soviet military capability. In October 1962, the U-2 photographed the buildup of Soviet

offensive nuclear missiles in Cuba, touching off the Cuban Missile Crisis. In more recent times, the U-2 has provided intelligence during operations in Korea, the Balkans, Afghanistan, and Iraq. When requested, the U-2 also provides peacetime reconnaissance in support of disaster relief from floods, earthquakes, and forest fires and supports search and rescue operations.

The U-2R, first flown in 1967, was 40 percent larger and more capable than the original aircraft. A tactical reconnaissance version, the TR-1A, first flew in August 1981 and was structurally identical to the U-2R. The last U-2 and TR-1 aircraft were delivered in October 1989; in 1992 all TR-1s and U-2s were designated as U-2Rs. Since 1994, $1.7 billion has been invested to modernize the U-2 airframe and sensors. These upgrades also included the transition to the GE F118-101 engine which resulted in the re-designation of all Air Force U-2 aircraft to the U-2S.

U-2s are home based at the 9th Reconnaissance Wing, Beale Air Force Base, California, but are rotated to operational detachments worldwide. U-2 pilots are trained at Beale using five two-seat aircraft designated as TU-2S before deploying for operational missions.

4. GENERAL CHARACTERISTICS

Primary Function: High-altitude reconnaissance

Contractor: Lockheed Martin Aeronautics

Power Plant: One General Electric F118-101 engine

Thrust: 17,000 pounds

Wingspan: 105 feet (32 meters)

Length: 63 feet (19.2 meters)

Height: 16 feet (4.8 meters)

Weight: 16,000 pounds

Maximum Takeoff Weight: 40,000 pounds (18,000 kilograms)

Fuel Capacity: 2,950 gallons

Payload: 5,000 pounds

Speed: 410+ miles per hour

Range: 7,000+ miles (6,090+ nautical miles)

Ceiling: Above 70,000 feet (21,212+ meters)

Crew: One (two in trainer models)

Unit Cost: Classified

Initial operating capability: 1956

Inventory: Active force, 33 (five two-seat trainers and two ER-2s operated by NASA); Reserve, 0; ANG, 0

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APPENDIX C. MISSION TYPE ORDERS

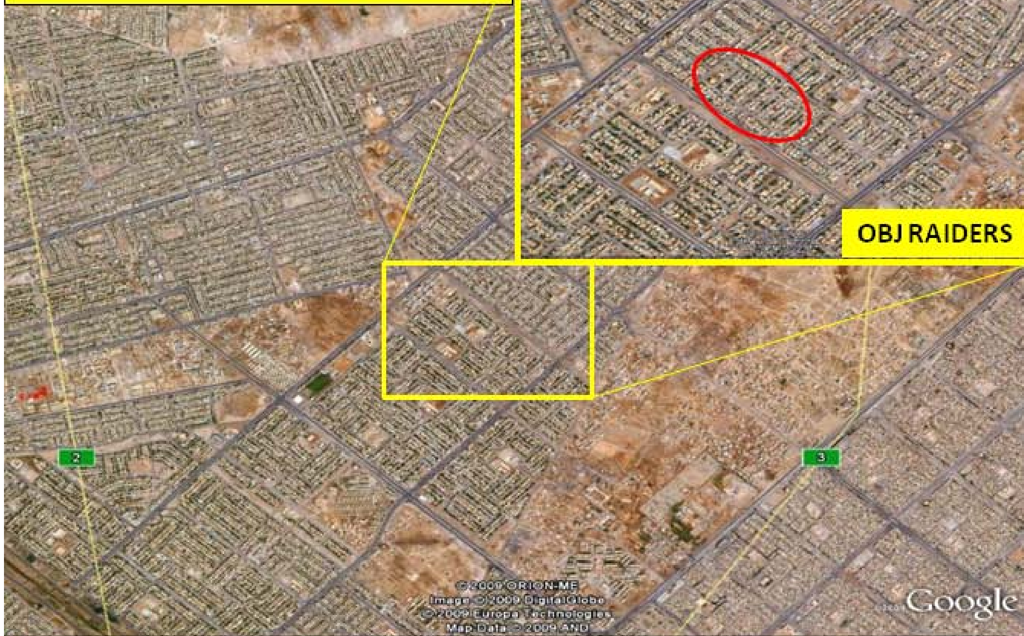
The following slides are examples of a graphical Concept of Operations (CONOPS) which uses a "mission type order" (MTO) format for conveying commander's intent, mission objectives, and the tasks of units. While specific guidance is provided for what assets should accomplish, taskings refrain from providing explicit instructions on how those missions should be carried out. This allows the subordinate leaders and crew members the flexibility necessary to execute their tactics, techniques, and procedures (TTPs) as necessary to best accomplish their goals. MTOs could very well be provided in a strictly textual format, however, this CONOP example is used because of the preferred method of including necessary supporting graphics for all involved participants, ensuring that all are "on the same sheet of music." Lastly, it is important to note that slides depicting maneuver element actions or ISR asset requirements are not separated but included in the same CONOPS to provide transparency of requirements, opportunities for improved support, and further review by all parties to ensure that essential tasks were not overlooked during planning.

CONOPS generally include four slides, beginning with the commander's intent and overview of the friendly situation. The second slide reviews enemy activity over the past few days and an assessment of their most likely and most dangerous courses of action. The most likely course of action is based on observed trends, established TTPs, and assessed objectives. The most dangerous course of action is selected based upon those actions (within the capabilities of the adversary force) that pose the greatest threat to the friendly mission. This allows commanders to begin developing contingency plans for enemy actions.

The third slide details friendly actions in the objective area to include a general timeline of events. The friendly scheme of maneuver is described both in the text and via the common graphics. Mitigation of threats is also detailed to include the employment of a quick reaction force (QRF). The fourth and final slide (which may not be in use by all units at this time), details the ISR concept of operations using the same graphics from the

previous slide. It provides general guidance for asset employment to include task (T) and purpose (P) descriptions, a timeline for ISR coordination, and a general overview of how ISR assets will be employed to support the operation.

Operation ALUMINUM FALCON

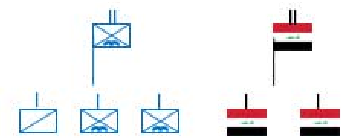


DTG: 220200JUN09

Key Info

CF Personnel: 275
\# of Vehicles: 37
\# of A/C: 1x TUAV, 2x FW, 2x AH
Pre-planned fires: none
Nearest City: Adimiyah, Baghdad
Planned Start date: 22JUN09
Planned End date: 22JUN09

Task Organization



Friendly Situation

In response to black market oil sales and sabotage of GoI pipelines, CFT 2-325 AIR stands postured to conduct raid to detain individuals associated with black market oil sales and to recover illegally obtained oil.

Commander's Intent

To capture personnel associated with oil theft and illegal sales.

Methods (Key Tasks): Isolate search area; conduct deliberate raids; conduct thorough SSE; collapse security, conduct overwatch, exfil.

Endstate: Oil black marketers captured; GoI capacity increased; CFT 2-325 postured for follow-on actions

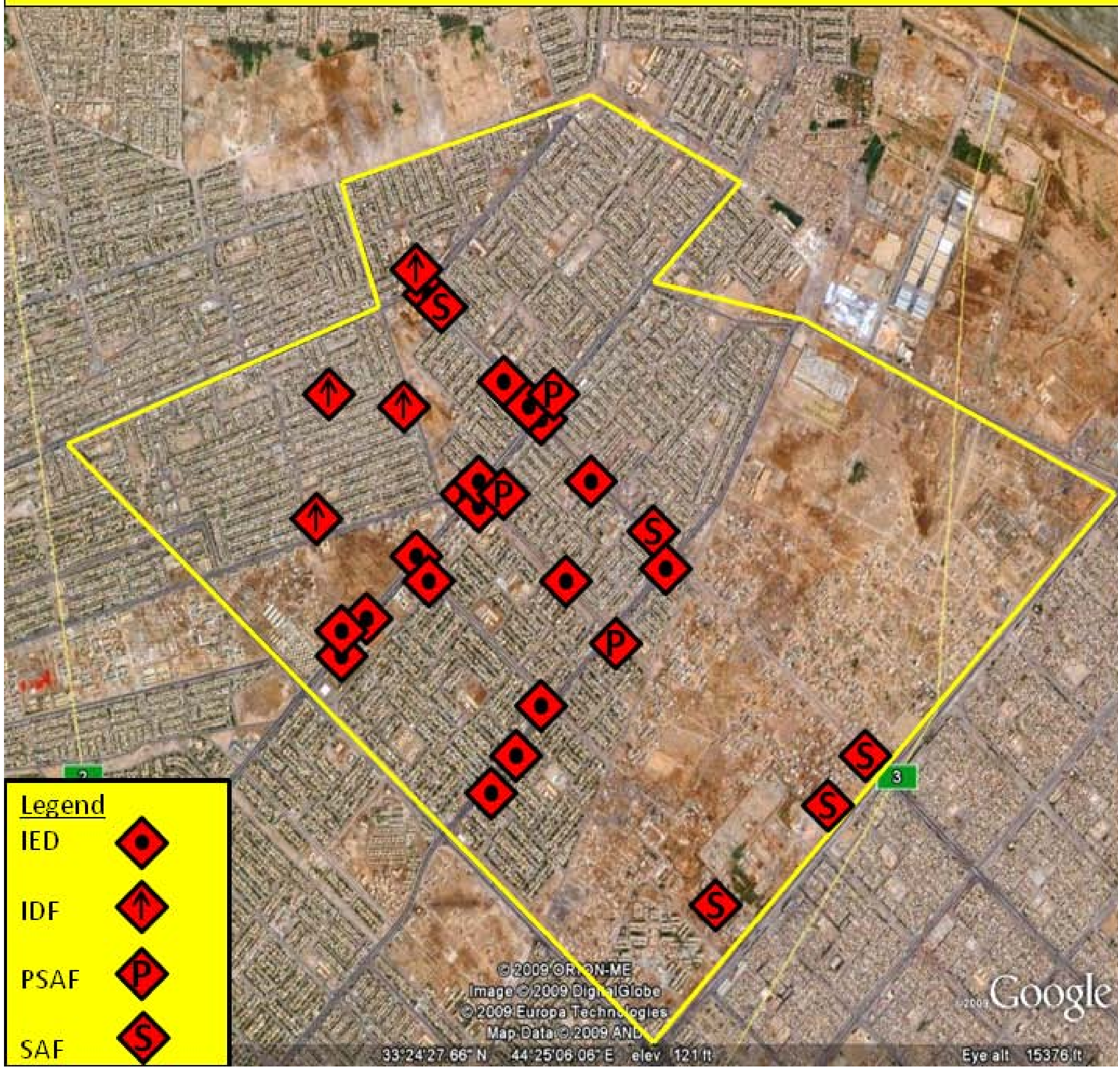
Political Impact in Area

This operation will assist in the detention of personnel involved in illegal oil sales, disrupt insurgent finances in the area, and restore law and order

Mission

O/O, CFT 2-325 AIR attacks in zone in OBJ RAIDERS IOT capture personnel associated with black market oil sales and to disrupt JAM activities and facilitators in AO

Last 72 Hours, 2-325 AIR, 2-82 ABN, Summary of Enemy Actions



AO Assessment:
Next 24-72 Hours

Enemy Most Likely COA:

IEDs emplaced along known CF routes of travel

Poss. complex ambush executed against CF patrol in insurgent neighborhood

IDF targeted against the Green Zone

Enemy Most Dangerous COA:

IEDs emplaced defensively in target neighborhood. House borne IED activated at target house.

Complex ambush executed along ingress/egress route.

IDF targeting US COP or IA base during back brief or rehearsal

Operation ALUMINUM FALCON

Non-kinetic Effects:

IO Message: Concerned citizens are greatest asset in the capture of criminals

PAO Assessment: Capture of black marketers will increase respect for law and order; GoI provided oil will increase support for legitimate capacity

Risk/Consequence Management

Risk: IED, RPG, PSAF, SAF

Mitigation measures: Closest friendly force will reinforce; QRF will be launched to reinforce; AH/TUAV will be requested for TIC

Consequence Management: If necessary: IO story boards, leadership enaggement, ISF to distribute info

Concept of Operations

The purpose of this operation is to capture personnel associated with black market sales of oil.

One CAV Co and one IA Co conduct screening operation to isolate OBJ RAIDERS NLT 220200JUN09 IOT facilitate execution of deliberate raid.

2x Rifle Co conduct ground infil NLT 220200JUN09 to conduct raid and search for black marketers. Search will begin with known bed down then move to all vans, trucks, and walled in compounds.

QRF: 1x Platoon with priorities: 1) Reinforcement, 2) Follow-on TST, 3) CASEVAC, 4) Detainee transport

Fire Support Plan: AH/FW support has been request

MEDEVAC Plan: QRF with ambulance to COP. HLZ Greg primary, HLZ Omar secondary, and HLZ Wilde tertiary.

Timeline

211900JUN09: Final back brief / rehearsal
220145JUN09: Isolation screen established
220200JUN09: Raid initiated
220500JUN09: Search complete; search element RTB
220515JUN09: Security collapses
220530JUN09: Initial detainee report and OPSUM completed

Operation ALUMINUM FALCON

ISR Concept of Operations

U-2 images OBJ RAIDERS. Target area graphics developed to identify routes to objective, entry/exit points into target building, and indications of defensive IED emplacements. Results reported to JTAC and S-2, presented to assault team prior to line of departure. EP-3E monitors insurgent communications for cuing of ambush/IED detonation or warning to HVIs. EP-3E reports directly to assault team JTAC. UAS establishes orbit over OBJ RAIDERS, provides overwatch for assault team, tracking HVI on objective area. UAV coordinates with ISROPS in TOC, relayed to JTAC. JSTARS monitors route of travel, providing warning of potential ambushes, roadblocks, or delays reaching objective. JSTARS monitors OBJ RAIDERS for "squirter vehicles." JSTARS chats with CGS operator, radio direct to JTAC.

ISR Effects

FMV: T: Track movement of pers on objective, track "squirters" from target
P: Provide SA for assault team on potential threats and to enable pursuit/capture of HVI
GMTI: T: Determine # of vehs arr/dep target location, ID traffic patterns/roadblock locations, track "squirters"
P: Warn assault team of developing threat, ambushes along route of travel and to enable pursuit/capture of HVI

IMINT: T: 360 deg coverage, ID entry points, ID potential ambush points, obstacles, and defensive IED emplacements
P: Provide overview of target area, entry/exit avenues/points for HMMWV/dismounts, ambush locations
SIGINT: T: provide early warning of comms btwn spotters/target/ambush
P: Warn assault team of potential threats to movement, assault, and extraction

Timeline

211900JUN09: Final back brief / rehearsal
220000JUN09: U-2 images target area
220045JUN09: JSTARS, EP-3E, UAV on station
220100JUN09: JSTARS monitors convoy movement; EP-3E monitors enemy comms; UAV begins surveillance of target area
220520JUN09: JSTARS monitors OBJ RAIDERS for squirters / target area for reinforcements
220515JUN09: JSTARS monitors convoy RTB; EP-3E monitors enemy comms
220545JUN09: JSTARS/EP-3E off-station

APPENDIX D. JOINT INTEGRATED AIR SUPPORT REQUEST FORM

The DD Form 1972 is the means by which Air Support Requests are submitted through the Close Air Support (CAS) channels. Airborne electronic warfare (EW) requests are also submitted via the DD Form 1972, formally known as the Joint Air Support Request (JASR), though with additional worksheets explaining the parameters and requirements specific to the EW mission. In 2006, the staff at Central Air Force (CENTAF) attempted to develop a method by which intelligence, surveillance, and reconnaissance (ISR) missions, normally submitted via PRISM or similar collection management specific software, can also be submitted via the same channels. The reason for this change in process was intended to improve coordination between ISR and non-ISR airborne operations, to provide a greater sense of transparency in the ISR tasking process, and to provide a method by which dual role assets (specifically the MQ-1 Predator and MQ-9 Reaper but also targeting pod equipped fighters) could be tasked to conduct both ISR and strike missions within the same sortie.

The attached DD Form 1972.1 Joint Integrated Air Support Request (JIASR) was the result of this effort. The form included here, however, has been modified by this author to better represent the needs of ISR planners and to emphasize the "effects based" approach to requests (rather than requesting specific sensors or weapon systems). The first page demonstrates the detailed integration required to coordinate airborne assets conducting CAS, EW, and ISR in the support of the same mission. There is also ample room (and instructions) for including additional graphics, forms, or instructions as necessary. The second page provides for the necessary coordination for organic assets and commander's controlled air and battlespace deconfliction. The third page is used to provide feedback following the mission. Ideally, this feedback should be specific by assigned asset as well as include lessons learned from the mission for improving future operations.

JOINT INTEGRATED AIR SUPPORT REQUEST

SECTION I - MISSION REQUEST

DATE OF REQUEST:

1 UNIT CALLED: | THIS IS: | REQUEST NUMBER: | SENT — TIME: BY:

2 [A] PRIORITY: CORPS DIVISION BRIG./REG. | RECEIVED — TIME: BY:

[B] COORD — BRIG. / REG. | DIVISION | CORPS | CAOC

3 MISSION / TARGET IS:

- [A] FRIENDLY OVERWATCH
- [B] ROUTE CLEARANCE
- [C] HIGH VALUE INDIVIDUAL (TRACK / RAID)
- [D] ENEMY PERSONNEL (OPEN / DUG-IN)
- [E] COUNTER-INDIRECT FIRE
- [F] BUILDING / COMPOUND
- [G] CACHE SITE
- [H] OTHER:

4 LOCATION: IVO: W/I 5NM OF BORDER: ☐ CHECKED BY:

[A] COORDS/AIRSPACE | [B] COORDS/AIRSPACE | [C] COORDS/AIRSPACE | [D] COORDS/AIRSPACE | ACCURACY:

[E] TGT ELEV: | [F] SHEET NUMBER: | [G] SERIES: | [H] CHART NUMBER: | SOURCE: | MENSURATED:

5 TIME/DATE

[A] ASAP [B] NLT [C] AT [D] TO

6 DESIRED STRIKE EFFECTS (select / prioritize all that apply) | DESIRED ISR EFFECTS (select / prioritize all that apply)

[A] LETHAL
- DESTROY
- NEUTRALIZE
- DISRUPT
- SUPPRESS
- DELAY
- DIVERT
- PROTECT

[B] NON-LETHAL
- DETER
- REASSURE
- DENY/DISRUPT
- DECEIVE
- PRE-DET
- ISOLATE

[C]
- FIND
- FIX
- TRACK
- TARGET
- ASSESS — REPORT INTERVAL:
- WARN — REPORT FORMAT:
- SURVEILLANCE
- RECONNAISSANCE

[D] TARGET DESCRIPTION / AMPLIFICATION OF EFFECTS: To insert graphics or additional files use: Insert-Object-Create from File-Browse

7 TERMINAL CONTROL

[A] JTAC [B] CALL SIGN: [C] FREQ:

[D] CONTACT PT

8 INTEGRATION CONCEPT (To insert graphics or additional files use: Insert - Object - Create from File - Browse)

[A] OPERATION NAME: | [B] OPERATION POC / CONTACT INFO | FREQ

POC NAME | CONTACT PHONE

UNIT | CALL-SIGN / mIRC ID | EMAIL

[C] COMMANDERS INTENT | [D] OPERATIONAL / MISSION OBJECTIVES

[E] CONCEPT OF OPERATION:

C2 HUB | SHOOTER

TIPPER | CROSS CUE

REMARKS (GO-NO GO CRITERIA, CODEWORDS, ETC.)

CENTAF FORM 1972.1, JAN 2006 *(MODIFIED BY AUTHOR, 01 OCT 2009)*

SECTION II - COORDINATION

9 ASSETS ASSIGNED (ORGANIC AND NON-ORGANIC) / REQUESTS SUBMITTED THROUGH OTHER CHANNELS

A Effect requested	B REQ. / PRISM #	C # / Asset Assigned	D Note / reason for disapproval / denying official / collection deck link

10 NSFS

11 ARTY

12 AIO/G-2/G-3

13 RESTRICTIVE FIRE / AIR PLAN

A IS NOT IN EFFECT B NUMBER

14 IS IN EFFECT

A (FROM TIME) B (TO TIME)

15 LOCATION

A (FROM COORDINATES) B (TO COORDINATES)

16 WIDTH (METERS)

17 ALTITUDE / VERTEX

A (MAXIMUM) B (MINIMUM)

CENTAF FORM 1972.1, JAN 2006

SECTION III - MISSION DATA / ASSESSMENT / JTAC MISREP

MISSION DATE		TIME		POC NAME		CONTACT NUMBER	
CATCH ID		ATO		RANK	UNIT	EMAIL	
OPERATION NAME				JTAC CALL SIGN			
ROE		PID				CDE	

GROUND CC INTENT	OBJECTIVE	TARGET(S)

CALL SIGN	# / TYPE AIRCRAFT	ROLE	TIME ON STATION	TIME OFF STATIO	BRIEF / DEBRIEF	SORTIE EFFECTIVE?
					/	
					/	
					/	
					/	
					/	
					/	
					/	
					/	
					/	
					/	

CALL SIGN	EFFECT REQUESTED	EFFECT DELIVERED (Include weapons employed, BDA, etc...)

SEQUENCE OF EVENTS (TIME / LOCATION / TASK)

OVERALL MSN SUCCESS:

DID AIRPOWER SUPPORT OR ASSIST IN ACHIEVING OBJECTIVE?

DID AIRPOWER SUPPORT OR ASSIST IN ACHIEVING GND/CC INTENT?

EXPLAIN: (REASONS / EXTERNAL MEASURES USED TO ASSESS EFFECTIVENESS, etc...)

MSN DEBRIEFED:

REMARKS / LESSONS LEARNED / EQUIPMENT ISSUES

CENTAF FORM 1972.1, JAN 2006 *(MODIFIED BY AUTHOR, 01 OCT 2009)*

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